ASSESSING PERPETUAL CONSERVATION EASEMENTS AS A TOOL FOR LAND PROTECTION: THE PRIVATE LANDOWNER PERSPECTIVE

A Dissertation

by

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ABSTRACT

Perpetual conservation easements have become one the primary tools used for long-term land protection and are credited with helping protect endangered species, preventing habitat fragmentation, maintaining ecosystem functions and conserving working rural landscapes. However, there has been scant research evaluating their sociological, ecological, or economic effectiveness. My research seeks to address this knowledge gap by focusing on the sociological consequences of conservation easement conveyance. Specifically, I used a mail survey, targeting landowners (n=518) throughout Texas owning property with conservation easements to evaluate: 1) landowners' private property rights orientations, 2) knowledge and understanding of their easement restrictions, 3) their overall satisfaction with their easement and the relationship with their easement holder, and 4) which types of natural resource management activities they conduct on their land. In addition, attitudes concerning private property rights and responsibilities were compared with data from a previous study (2002) of rural Texas landowners. The mail survey was followed with telephone interviews (n=34) to further examine issues identified during the mail survey data analysis and contributing to landowner dissatisfaction with their conservation easement.

Examination of easement landowners' private property rights orientations revealed that while they express strong attitudes concerning private property rights, these attitudes were not as strong as those identified in a previous study of other rural Texas landowners. Analysis of easement landowners' self-assessed knowledge concerning restrictions prescribed in their conservation easement failed to find any variables that

significantly influenced their knowledge and understanding of their conservation easement. Overall, landowners were satisfied both with their conservation easement and with the relationship with their easement holder with two exceptions. Both successive generation landowners who did not grant the original easement and landowners with conservation easements held by a federal agency were significantly less satisfied with their conservation easements and with their easement holding organization. Finally, natural resource management on conservation easement protected properties was influenced by land ownership motivations and by the easement holders' programmatic goals. The results of this study highlight the need for strengthening relationships between landowners and easement holders, incorporating more adaptive management flexibility into easement restrictions and developing strategies that provide additional incentives to successive generation conservation easement landowners.

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My sincerest hope is that they have learned the importance of education but also the importance of maintaining family.

NOMENCLATURE

CUA	Compatible Use Agreement
M	Mean
NRCS	Natural Resources Conservation Service
SD	Standard Deviation
TNC	The Nature Conservancy
TPWD	Texas Parks and Wildlife Department
USFWS	United States Fish and Wildlife Service

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Introduction

My research focuses on the use and effective maintenance of perpetual conservation easements as a strategy for protecting ecosystems from the deleterious effects of land subdivision and development. Recent research has examined the spatial distribution patterns of conserved lands and the types of development allowed on easement properties (Rissman et al. 2007; Kiesecker et al. 2007; Merenlender et al. 2004). In addition, numerous publications offer prescriptive guidance for establishing and negotiating conservation easements (Gustanski and Squires 2000; Lindstrom 2008; Byers and Ponte 2005). However, minimal research has been conducted to determine the sociological implications of establishing perpetual conservation easements. To address this knowledge gap, I use both social science survey and interview methodologies to comprehensively evaluate factors that are critical for effectively maintaining conservation easements at multiple scales.

A conservation easement is a voluntary deed restriction placed on a piece of property that constrains the ways in which that property may be used. While some conservation easements are temporary, lasting from five to 25 years, many are designed to last in perpetuity. The establishment of conservation easements is a primary tool in both private and public environmental conservation organizations for achieving a variety of goals. Most conservation easement programs are designed to reduce or prevent land

fragmentation in ecologically important landscapes. While conservation easements prioritize protection of habitat, one survey found that over half of such easements allowed for compatible commercial land uses including ranching, hunting, forestry and recreation (Rissman et al. 2007).

While many conservation practitioners and private landowners have become adept at negotiating easements, to be effective, it is also imperative that the easements are sustainable in the long-term. The long term success of conservation easements will depend not only on the capacity of the easement holder to enforce the easement; it will also depend on support for maintaining the easement from the landowners who own the property. The promotion of new conservation easements needs to be underpinned by rigorous empirical information that examines both the successes and challenges in effectively maintaining such permanent property right adjustments.

Background

While use of conservation easements has become one of the most popular strategies for conserving land in the United States, the idea of permanent conservation easements is relatively young. First proposed in 1959 by William Whyte, Jr., the idea of permanent restraints on property usages were viewed as an anathema to common law (Pidot 2005; Whyte Jr 1959). Furthermore, common law courts would not recognize deed restrictions that "run with the land", meaning that the restrictions would transfer to subsequent landowners in order to prevent "dead hand control", where the desires of the deceased control the actions of the living (McLaughlin 2005). Because of this conflict with common law, most conservation easement enabling laws were enacted by state

statute. By 1980, most states had passed legislation allowing for permanent easements. Mirroring the work of the states, in 1980-81 the U.S. Congress adopted tax subsidies for donated conservation easements and passed the Uniform Conservation Easement Act of 1981 (UCEA) which allowed states to adopt uniform legal guidelines for conservation easements. By 2010, 49 states (all except North Dakota) had adopted conservation easement enabling statutes, many of which are modeled on the UCEA (Levin 2010). The acceptance of conservation easements as a legal permanent property right adjustment throughout the country ignited the current explosive proliferation of easements. Until the mid-1990's the acreage of land protected by land trusts using conservation easements was comparable with land owned by land trusts through outright fee-simple ownership (Figure 1). However, by 1995, land trusts protected more land by easement than ownership.

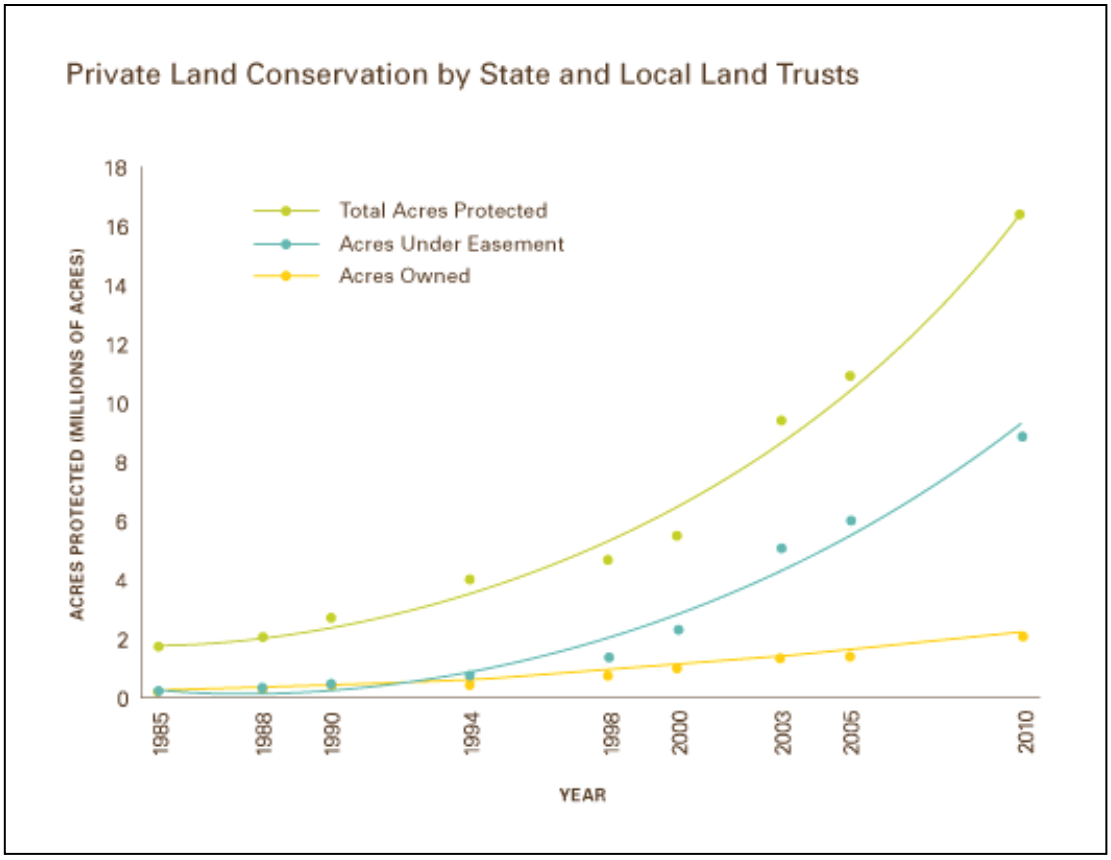

Figure 1. Land trust private land conservation 1985-2010 (Chang 2011).

The total area of conservation easements held by private land trusts in the U.S. continues to increase; rapidly expanding from 2.5 million acres in 2000 to over 8.8 million acres in the U.S. by 2010 (Chang 2011). Furthermore, it is estimated that the U.S. Department of the Interior holds an additional 12 million acres of conservation easements (Pidot 2005). At the onset of this research study, there were an estimated 530 conservation easements in Texas held by 33 different organizations, both private and public, extending over approximately 596,425 acres (D. Bezanson, The Nature

Conservancy, personal communication, 2010). Between 2010-2013, the number of acres protected by land trust held conservation easements in Texas grew by almost 34% (Texas Land Trust Council 2012), which illustrate the exponential growth of easements as a land conservation tool. Texas has an independent non-profit organization (the Texas Land Trust Council) that tracks and provides basic information (acreage, county of location) about easements held throughout the state, based on data voluntarily submitted through land trusts. Combining this information with easement data from government agency held easements provides a good assessment of the number and relative spatial distribution of conservation easements in Texas. However, it is important to note that no one knows, or has a good approximation, of how many conservation easements there are in the United States (Korngold 2007; Pidot 2005).

Literature Review

Literature concerning conservation easements has usually focused on the legal issues surround the negotiation, drafting, enforcement and tax implications of easements (Byers and Ponte 2005; Gustanski and Squires 2000; Lindstrom 2008). However, more recently there has been research that seeks to examine a wider range of issues surrounding perpetual conservation easements. In 2005, Pidot published an extensive working paper that outlined the history of conservation easements and issues that emanate from the establishment of conservation easements. Pidot (2005) aggregated these issues into broad categories including, "(i) the content and uniformity of easements, (ii) conservation easement tracking for the future, (iii) public benefit, accountability and transparency with respect to conservation easement creation, (iv)

conservation easement holder stewardship, institutional capacity and accountability, (v) conservation easement durability, amendment and termination, (vi) conservation easement appraisal and tax issues, (vii) the implications of conservation easements on government regulatory, public land acquisition and land taxation programs and (viii) equity and environmental justice issues related to conservation easements". These issues surrounding conservation easements highlight the scope of the subject. However, only within the last decade have there been any substantial attempts to empirically evaluate conservation easements.

Merenlender et al. (2004), called for interdisciplinary research to examine the ecological and social consequences of conservation easements. This was followed in 2007 with two papers that reported results from a survey of staff from The Nature Conservancy, the largest non-governmental conservation easement holder. The survey asked detailed questions about 119 different easements that had been established between 1985-2004. The results provided information about the original intents and purposes of the easements and the allowable private land uses on the conserved lands (Rissman et al. 2007; Kiesecker et al. 2007). More recently, Rissman et al. (Rissman et al. 2013) has examined land management flexibility incorporated in easement programs noting that prescribed restrictions often preclude effective adaptive management. While there has been some research that includes landowners with easements, there has been little reported research that has specifically targeted landowners that own property encumbered with perpetual conservation easements. A 1997 survey of conservation easement landowners in the Northeast, found that grantor landowners were, in general,

highly satisfied with their easement and were not primarily motivated to grant an easement for financial reasons. They also concluded that successive generation landowners were satisfied with their knowledge of easement restrictions but expressed a desire for more ongoing contact with their easement holding organization (Feinberg and Luzadis 1997). Furthermore, Feinburg and Luzadis (1997) reported that 37% of successive generation easement landowners would, given the option, amend their easement, compared with just 19% of grantor landowners. However, the Feinburg and Luzadis (1997) study only included easements held by just four private NGO's and one state agency which may have masked distinct institutional differences influencing landowners satisfaction. One 2002 paper interviewed 46 landowners in California, asking about their motivations for granting an agricultural easement on their property and their experiences operating under the terms of their easement (Rilla 2002). All of the conservation easements in this study (n=46) were purchased easements and 36 of the participants were the original grantors of the easement. The remaining participants had purchased their property with the easement in place. Land preservation and economic considerations were the primary motivations represented within this group of landowners (Rilla 2002). In 2011, Farmer et al. specifically examined landowner motivations driving easement conveyance. Place attachment and "contributing to the public good" both appeared to be strong drivers for landowners granting an easement, and conversely, financial incentives were the lowest ranked motivational factor (Farmer, Knapp, et al. 2011). Another study reported in 2008 surveyed 125 landowners involved in a range of private property conservation programs, including permanent easements

(Wallace et al. 2008). The resulting information examined landowners perceptions about the societal benefits derived from the protection of their land. Protecting open space and wildlife habitat and promoting scenic and amenity values were the most frequently cited benefits landowners reported deriving from their protected property. Finally, Rissman and Sayre (2012) interviewed private landowners and easement holders collaborating in small, spatially-focused easement programs. They determined that formation of strong social networks between landowners and easement holder staff often resulted in increased indirect outcomes, namely increased access to technical guidance and financial assistance for landowners conducting natural resource management on their easement-protected property.

Goals and Objectives

The overarching goal of this research is to comprehensively evaluate the current use and sustainability of perpetual conservation easements in Texas from the landowners' perspectives about such easements. The perceptions, attitudes, inclinations and land management behaviors of landowners who have conservation easements were explored. Understanding landowner's knowledge, beliefs and personal norms regarding their conservation easements can provide insight into their behavior (Stern 2000). Finding ways to reinforce landowner's conservation-oriented behaviors and address negative environmental behaviors is essential for maintaining long-term landowner compliance with conservation easement terms. Both the survey and the interview components of this research include landowners who granted the easement on their property (grantor landowners) as well as "successive generation" landowners, those who

acquired the property with the easement already in place. The latter group of landowners is one that is starting to grow, but about which almost nothing is currently documented. This type of landowner may be a potential source of future conflict because he/she did not receive any of the up-front benefits of the conveyance of the easement (tax deductions or purchase payment) but is saddled with the encumbrances. As land ownership changes hands, new landowners, who gain no monetary value, may be less enthusiastic about conservation easements and less interested in adhering to their constraints. One informal survey conducted in 2000 found that out of 21 litigated conservation easement violations, 19 were committed by successive generation landowners who did not grant the easement (Danskin 2000). This finding mirrors other studies indicating that non-grantor easement landowners are much more likely to violate the terms of their conservation easement (Rissman and Butsic 2011; Aldrich 2006). In 2006, the Land Trust Alliance, an umbrella group supporting the land trust community, indicated that the biggest challenge faced by land trusts in the future will be their inability to defend easements (Aldrich 2006).

The goal of my research is to address five primary objectives:

O1. Establish the private property rights orientations of easement landowners

O2. Evaluate landowners overall satisfaction with their permanent conservation easements

O3. Assess the relationship between easement landowners and their easement holding organization

O4. Assess landowners' self-reported knowledge of their easement restrictions and factors influencing that knowledge

O5. Evaluate land management practices on easement protected properties

Common to each one of these objectives is the use of social factors that explain the observed response.

The first objective (O1) assesses the property rights orientations of easement landowners. Understanding property rights attitudes is important because attitudes influence behavior. Previous research indicates that private landowners, and Texas landowners in particular, are less likely to adopt socially responsible land management practices if those practices negatively affect their property rights (Kabii and Horwitz 2006; Kreuter et al. 2006). This included such land management objectives as maintaining water quality, controlling noxious weeds, protecting wetlands and riparian areas, protecting threatened and endangered species habitat and providing access for hunting. In the same study, many Texas landowners were also less inclined to participate in management practices without receiving some form of compensation (Kreuter et al. 2006). Conservation easements may overcome this reluctance by providing compensation to the landowner in the form of a direct payment or tax deductions. However, the incentive is generally a one-time benefit to the easement-granting landowner but provides no benefit to subsequent landowners. As landowners become temporally removed from the easement granting or as land ownership changes hands, landowner support for easement restrictions may weaken. Maintaining strong property

rights requires explicit definition of those rights and near-universal support for protecting those rights to work effectively (Fairfax et al. 2005). Understanding how easement landowners perceive their property rights and their social responsibilities with respect to land management with an easement in place is key to developing strategies for protecting the easement rights for the easement holder and for maintaining the acceptability of easement restrictions to the landowner.

The second objective (O2) will evaluate landowner's self-reported sense of satisfaction with their conservation easement. The idea of "place satisfaction" has been well documented in the literature and is defined as the utilitarian characteristics of a place that provide a person's basic needs such as sociability or physical needs. Several studies have shown that place satisfaction is positively associated with pro-environmental behaviors (Ramkissoon et al. 2012; Lopez-Mosquera and Sanchez 2011; Ramkissoon et al. 2013). I argue that easement satisfaction contributes to place satisfaction from the perspective of a landowner and may therefore be one metric useful in predicting pro-environmental behaviors of easement landowners. Furthermore, maintaining landowner's easement satisfaction is critical for reducing potential conflicts between landowners and easement holders. Easement satisfaction also has the potential to impact the likelihood of future easement programs. If the prevailing attitude of landowners with easements is negative, it has the potential to undermine efforts to create or expand new easement efforts. This includes both the conveyance of easements and funding mechanisms critical to program success such as preferential tax incentives.

Objective three (O3) focuses on evaluating the relationships between easement landowners and the partner organizations that hold title to their conservation easement. The conveyance of a conservation easement establishes a perpetual relationship between the landowner and the organization that holds that easement. The framework of this relationship has several potential consequences. Positive relations between landowners and easement holders have been shown to increase conservation-oriented management on easement lands (Rissman and Sayre 2012). Conversely, negative relationships may lead to higher conflict potential, increased compliance violations and decreased public acceptance of easements as a viable protection tool (Rissman and Butsic 2011).

The fourth objective (O4) of this study is to assess landowner perceptions concerning their knowledge of the easement requirements and restrictions on their property. If landowners do not understand the restrictions required in their easement, they are more likely to incur violations. Easement violations can be costly to both the easement holder and the landowner and can undercut the original conservation purposes of the easement. A 2008 survey of land trusts found that 47% of respondent organizations reported at least one legal challenge to a conservation easement and 11% of respondents reported a major legal challenge, defined as incurring $5,000 or more in expenses to resolve (Rissman and Butsic 2011). Furthermore, the number of reported major legal challenges has been increasing over time and the majority of reported easement violations involved subsequent generation landowners (Rissman and Butsic 2011).

The fifth objective (O5) of this research is assessing easement landowners' past and current participation in land management practices above and beyond what is required by the easement. Most conservation easements do not require the application of specific land management practices. Conservation easements are, therefore, generally a "negative easement", meaning that they prohibit or limit certain activities such as subdivision and development but typically do not specify any conservation-oriented land management practices. However, the utility of conservation easements can be enhanced by engaging landowners to participate in beneficial conservation practices on their land. Incentive-based land management programs available through public agencies, such as the EQIP program provided through the Natural Conservation Resources Service (NRCS), can provide easement landowners with on-going incentives to protect or enhance the ecosystem services provided by their land. Furthermore, easement landowners can benefit by partnering with their easement holders to identify appropriate programs, assist landowners with funding requests and provide implementation assistance (Rissman and Sayre 2012; Pocewicz et al. 2011). Such land management collaboration may be one strategy for maintaining a positive relationship between easement holders and landowners. Building institutional trust between easement holders and landowners is critical to maintaining the long-term integrity of an easement property right.

Theoretical Framework

This research seeks to gain an understanding of the perceptions, attitudes, inclinations and land management behaviors of conservation easement landowners. The

research objectives outlined in this proposal draw from three separate theoretical frameworks: private property rights theory, value-belief-norm theory (VBN) and social exchange theory.

Private Property Rights Theory

The first objective is grounded (O1), in part, by private property rights theory. Private property is generally perceived as existing not as one specific right but as a bundle of rights. One oft-used metaphor for this conglomeration of property rights is the "bundle of sticks". Using land to demonstrate this example, a private landowner may purchase a piece of property but not own all of the property rights (or sticks) associated with that specific piece of land. For example, the owner may have the right to exclusively use the surface of the land but may not own the subsurface mineral rights or the water rights on the property. Characteristics of well defined property rights include:

1. Exclusivity – Defined as the right to exclude others from using your property
2. Transferability – Defined as the right to freely transfer the property to others, with or without compensation
3. Enforceability – A vested right in property can be enforced through a variety of means. Most commonly, the state defines and enforces the nature of property rights. However, property rights can also be enforced by implicit social institutions (Reynolds 2005).
4. Specificity – Owners definable property entitlements.

Landowners who have conveyed a conservation easement have intentionally relinquished some of the property rights associated with their easement property.

Previous research with private landowners in Texas found that while most landowners agreed that property ownership conveyed the primary property rights of exclusivity, transferability and enforceability, many also agreed that property ownership also carried with it certain responsibilities (Jackson-Smith et al. 2005). This included perceived responsibilities to neighbors, local communities and society in general. Landowners who grant conservation easements may, in part, do so because of their beliefs about private property rights and responsibilities. However, subsequent generation conservation easement landowners did not voluntarily relinquish their property rights; they accepted them as a condition of receiving their property. This group of landowners may possess stronger property rights orientations and weaker property responsibilities beliefs.

Value-Belief-Norm Theory

The first, second and fifth research objectives (O1, O2 and O5) are underpinned by the value-belief-norm theory of environmental behavior. In 2000, Paul Stern published a paper outlining a theory describing environmentally significant behavior. Referred to as the value-belief-norm theory of environmentalism (VBN), it assesses relationships between environmental concern and behavior (Stern 2000). Stern differentiates environmental behaviors into several classes including: environmental activism, non-activist behaviors in the public sphere, private sphere environmentalism and other environmentally significant behaviors. VBN links distinct causal variables together into a model that is used to predict behavior (Figure 2).

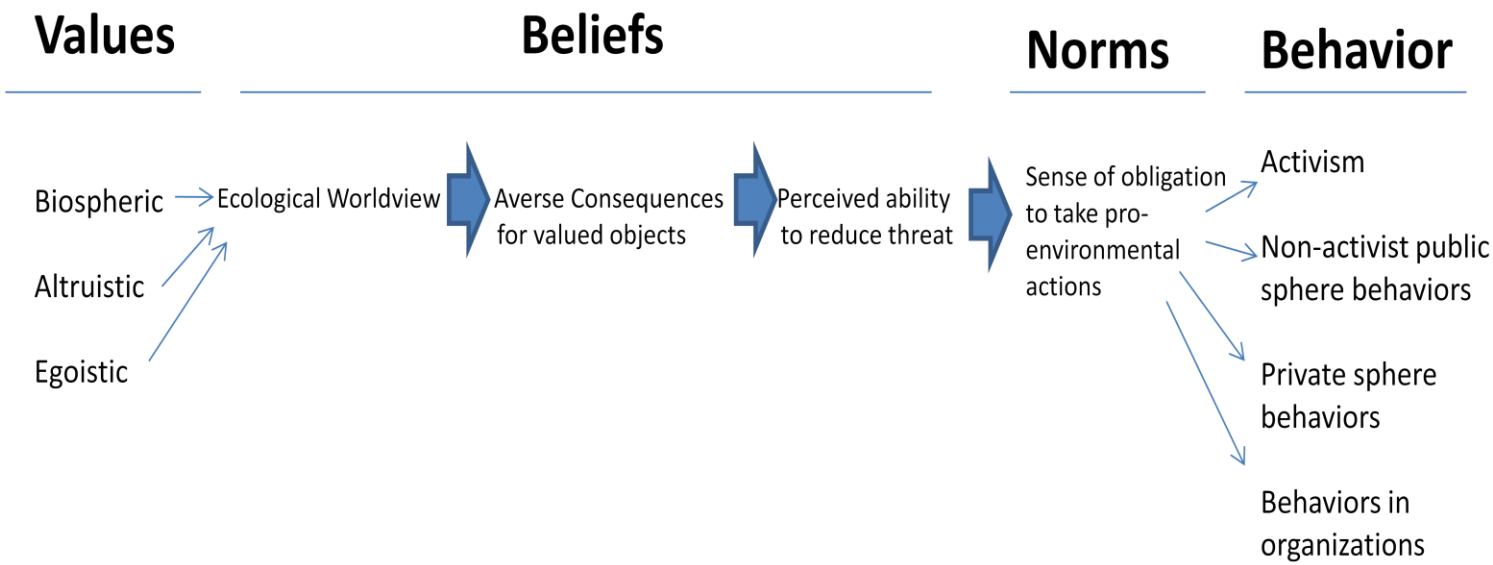

Figure 2. Causal variables of environmental behavior (Stern 2000).

Here, an individual's progression from values to environmental behavior is mediated by their beliefs. For example, a person may believe that something or someone they value will experience adverse consequences from a particular environmental outcome (Lopez-Mosquera and Sanchez 2012). Their beliefs coupled with their normative view of the situation will direct their behavior. Sterns' work strongly supports the conclusion that personal moral norms provide the driving force behind an individual's inclination towards pro-environmental behavior.

However, as Stern mentions, there are other outside forces that can also affect behavior. Contextual factors including: interpersonal influences, community expectations, social norms, advertising, government regulations, institutional factors and monetary incentives and costs all act as external forces that can influence behavior (Stern 2000). Guagnano et al. (1995), found that attitudinal factors, which include values, beliefs and norms, are strong predictors of behavior when contextual factors are neutral. However, when contextual factors are either strongly positive or negative the effect of attitudinal factors on behavior approaches zero (Guagnano et al. 1995).

In a situation where a landowner conveys a conservation easement, they may have strong contextual factors which affect their decision to grant the easement. Most landowners who grant a conservation easement receive a monetary incentive (contextual factor) to do so. The easement may have been purchased by a public or private institution as part of a conservation program, in which case the landowner is compensated for the value of the easement. Alternatively, if a landowner donates an easement on their property, they can claim the value of the easement as a tax deduction.

However, this monetary incentive is a one-time benefit to the granting landowner. Subsequent landowners of the same property do not receive the same benefit. As time passes from the granting of the easement, contextual forces may trend towards neutral and landowner's attitudinal factors may play an increasing role in their behavior towards maintaining their easement. Previous research demonstrates that landowner satisfaction is positively correlated with pro-environmental behaviors (Ramkissoon et al. 2012; Lopez-Mosquera and Sanchez 2011). While landowners have already committed to the pro-environmental behavior of owning easement-protected property, maintaining that property in a way that maintains or enhances the conservation values of that property may require on-going management inputs. It is possible that landowners who are more satisfied with their conservation easement are also more willing to commit the resources required for management improvements.

Social Exchange Theory

In addition, objectives two through five (O2, O3, O4 and O5) draw from social exchange theory. Social exchange theory posits that when two entities have a strong, positive interdependent relationship, they are more willing to engage in a continuing reciprocity (Cropanzano and Mitchell 2005). In this case, reciprocity is an exchange of information (i.e. knowledge) concerning the conservation easement. Landowners who have strong interdependent relationships with easement holding institutions are more likely to perceive their easement knowledge is strong because their knowledge is reinforced through their relationship with the holding institution. If however, those relationships weaken due to temporal distance from easement negotiation, changes in

landownership or weak relationships with the easement holding institution, landowners are less likely to feel like they understand the terms of the easement.

Dissertation Organization

My dissertation is organized into five chapters. This first chapter provides an introduction to my topic, a review of previous literature, an overview of my five research objectives and the three theoretical frameworks used for measuring those objectives. Table 1, provides a synopsis of each of the remaining four chapters, highlighting the research objectives and theoretical frameworks underpinning each chapter.

Table 1. Organizational structure of the four data chapters indicating the objectives addressed and the applicable theoretical frameworks in each chapter.

Chapter/Title	**Objective(s) addressed**	**Theoretical framework(s)**
II. Balancing property rights and social responsibility: Conservation easement landowners weigh perpetual protection	O1	Private property rights theory Value-belief-norm theory
III. Perpetual conservation easements and landowners: Evaluating easement knowledge, satisfaction and partner organization relationships	O2, O3, O4	Value-belief-norm theory Social exchange theory
IV. Factors influencing land management practices on conservation easement protected landscapes	O5	Value-belief-norm theory Social exchange theory
V. Landowner satisfaction with the Wetland Reserve Program in Texas: A mixed methods analysis	O2, O3	Value-belief-norm theory Social exchange theory

CHAPTER II

BALANCING PROPERTY RIGHTS AND SOCIAL RESPONSIBILITY: CONSERVATION EASEMENT LANDOWNERS WEIGH PERPETUAL PROTECTION

Overview

A conservation easement is a voluntary deed restriction that alters property rights by restricting how land may be used by preventing most development and subdivision. Currently, over 20 million acres of land in the Unites States are protected through conservation easements. While the role of property rights in enabling conservation easements is well documented, the attitudes of landowners living under those altered property rights regimes has not been thoroughly researched. To address the knowledge gap, landowners in Texas with perpetual conservation easements were invited to participate in a mail survey and resulting data were compared with prior research on the perspective of non-easement rural landowners about property rights. Our study indicates that easement and non-easement landowners differ significantly in their attitudes concerning both property rights and social responsibilities with respect to land management. While landowners in both groups overwhelmingly agreed that property ownership conveyed certain fundamental rights, non-easement landowners were more likely to express stronger traditional property rights attitudes than their easement landowner counterparts. However, counter to expectations, they were also more likely to express a stronger land stewardship ethic. We also found significant demographical differences between the two groups with easement landowners tending to be younger,

have more formal education, less likely to live on their rural property, and have owned their rural property for a shorter amount of time. Analysis of intra-group differences among easement landowners failed to find differences between easement-granting and successive generation easement landowners with respect to property rights orientations but did find significant attitudinal differences between genders. Our research implies that landowners willing to accept substantial property rights adjustments designed to facilitate environmental protection goals may have inherently different attitudes concerning fundamental property rights ideals.

Introduction

Effective natural resource conservation on private lands is essential for protecting the full suite of ecosystem functions required for sustaining life (Hilty and Merenlender 2003; Scott et al. 2001). However, private landowners often have limited incentive to protect resources on their property that provide ecosystem services to society. In part, this is because many land-based resources are non-excludable public goods that effectively prevent private landowners from capturing the full value of those resources (Daly and Farley 2004). Increasingly, conservation easements are used to provide compensation for private land conservation and, by extension, the provisioning of ecosystem services, using direct payments or tax incentives. A conservation easement, called a conservation covenant outside of the United States, is a voluntary deed restriction that alters property rights by restricting how the land can be used, specifically by preventing most development and subdivision. In addition, through the establishment

of such easements, conservation organizations can protect more land for less monetary outlays than the cost of outright fee simple ownership (Fairfax et al. 2005).

Recent research has begun to empirically evaluate the ecological and economic effectiveness of conservation easements ecologically (McDonald et al. 2007; Kiesecker et al. 2007; Rissman et al. 2007; Pocewicz et al. 2011; Noone et al. 2012; Iftekhar et al. 2014; Newburn et al. 2005). However, as a property right constraint, conservation easements are a social construct. Understanding the sociological implications of easements is essential for evaluating their overall efficacy. Several studies have examined motivational drivers of easement conveyance (Farmer, Chancellor, et al. 2011; Miller et al. 2010; Wallace et al. 2008; Brenner et al. 2013) but there is scant research reporting on landowners' attitudes about their easements once the they are in place (McLaughlin 2005; Cheever 1996; Rilla 2002). In addition, while the role of property rights in enabling conservation easements is well represented in the literature (Adams and Moon 2013; Demsetz 2002; Heltberg 2002; Rissman 2013; Stoms et al. 2009), little research has been conducted to illuminate the attitudes of landowners living under altered property rights that characterize easement-encumbered property.

While conservation easements may protect the land from fragmentation and most infrastructural development, on-going management is necessary to protect ecological targets the easement was designed to conserve. It is also possible that concerns over the loss of property rights may influence landowners' desire to challenge the terms of the easement restrictions. Understanding easement landowner's property rights orientations is important because attitudes affect behavior (Lopez-Mosquera and Sanchez 2012;

Stern 2000). Opinions concerning property rights have been found to influence landowners willingness to convey conservation easements (Kabii and Horwitz 2006). In addition, Kreuter et al. (2006) found that property rights orientations were better predictors of landowners' use of socially desirable management on their property than other socio-demographic variables, including age, education, income or residency on their land.

Property rights systems in the U.S. were traditionally established by common law, which is determined by precedent or case law and is distinguished from statutory or regulatory laws that are promulgated by legislatures or the executive branch, respectively. Under common law, courts were unlikely to enforce perpetual conservation easements because they are considered a type of "negative easement", meaning, certain actions are not permitted, with the intention that the restrictions will confer a benefit to the wider public. Historically, common law courts would not recognize negative easements unless the primary beneficiaries of the easement were the adjacent landowners, not the broader community (Parker 2004). Furthermore, common law courts would not recognize deed restrictions that "run with the land", meaning that the restrictions would transfer to subsequent landowners in order to prevent "dead hand control", where the desires of the deceased control the actions of the living (McLaughlin 2005). In response to these legal limitations, the National Conference of Commissioners on Uniform State Laws authored a statutory model in 1981, called the Uniform Conservation Easement Act (UCEA) to serve as a model for state statutes enabling permanent conservation easements (Parker 2004). By 2010, 49 states (all except North

Dakota) had adopted conservation easement enabling statutes, many of which are modeled on the UCEA (Levin 2010). Since then, the application of conservation easements as a conservation tool has increased exponentially. Current estimates approximate over 20 million acres in the Unites States are protected through conservation easements held by private and public entities (U.S. Department of Agriculture 2013; Pidot 2005; Chang 2011).

Property rights are used to define owners' rights, privileges, obligations and constraints with respect to a resource. Most commonly, the state defines and enforces the nature of property rights but property rights can also be enforced by implicit social institutions (Reynolds 2005). Private property rights are generally perceived as a bundle of rights (synonymous with a "bundle of sticks"). A private landowner may purchase a piece of property but not own all of the rights (or sticks) associated with that specific piece of land. For example, an owner may have the exclusive right to use the surface of the land but may not own the rights to water or subsurface minerals on the property. Similarly, once an easement has been conveyed, some property rights have been effectively split between two owners: the landowner who retains the right to use the land in a restricted manner and the easement holding organization that owns the rights that have been separated out (e.g., subdivision and development rights).

To analyze landowner perceptions about their property rights, I compared two data sets. The first data set was derived from a 2011 survey of easement-landowners across Texas. The second data set was obtained by a 2002 survey of a broad range of landowners in two Texas counties, Llano and Sutton, located in the Edwards Plateau

eco-region of Texas and which are characterized by conservation-oriented management goals of many landowners (Jackson-Smith et al. 2005). In both surveys, landowners were asked about their private property rights. These two data sets allow comparison of differences in landowners with and without conservation easement-related constraints regarding their property rights attitudes and their responsibilities regarding managing natural resources on their property. To this end, I tested four hypotheses:

H1: *Landowners with easement-encumbered properties will express less categorical property rights attitudes than other rural landowners.* This is because easement landowners do not enjoy the full suite of traditional private property rights and, therefore, their expectations of strong, inalienable property rights may be diminished compared with other private landowners.

H2: *Compared to other rural landowners, those with easement-encumbered properties will express a greater sense of responsibility towards protecting natural resources on their property in a way that provides benefits to society*. Previous research investigating motivations for easement conveyance, indicated that most easement landowners or potential easement grantors exhibit strong pro-environmental values which I believe will be reflected in their attitudes towards stewardship of natural resources on their property (Farmer, Chancellor, et al. 2011; Rilla 2002; Farmer, Knapp, et al. 2011; Brenner et al. 2013; Ernst and Wallace 2008).

H3: *Grantor easement landowners will exhibit less categorical attitudes about property rights than successive generation easement landowners*. Previous research suggests that property rights notions influence landowners' decision-making with respect

to easement conveyance (Kabii and Horwitz 2006; Miller et al. 2010). In conveying the conservation easement, grantor landowners voluntarily surrender some of their property rights whereas landowners who acquired their properties after the conservation easements were established may be more concerned about the relinquished property rights.

H4: *Women are more tolerant of property rights restrictions and feel a greater social responsibility to manage natural resources for the benefit of others than men.* Previous research found that women are more satisfied than men with conservation easements and the relationship with their easement holding organization (Stroman and Kreuter 2014). In addition, research shows women tend to exhibit more pro-environmental behaviors than men (Dietz et al. 2002; Zelezny et al. 2000), a finding that may correlate with their property rights attitudes.

Methods

Property rights orientation data for easement landowners were collected in 2011 as part of a mail survey sent to Texas landowners who own property with a perpetual conservation easement. Every entity holding permanent conservation easements in Texas (n=33) was contacted via letter asking for their assistance in identifying easement landowners to participate in the survey. Ultimately, 16 out of 33 easement holders provided contact information for 429 landowners. Some organizations indicated that specific landowners were not interested in participating and they were excluded from our sample. One organization, representing 20 landowners, did not release contact information but did participate in the study by concurrently mailing out survey materials

to their easement landowners. The remaining 16 easement-holding organizations, which held an estimated 80 easements declined to participate. However, using county record searches I was able to obtain contact information for 69 of these 80 landowners. Therefore, our study included almost the whole population of Texas landowners with conservation easement in 2011. I began the survey with a sample size of 518 landowners.

The survey was conducted beginning September 2011 and consisted of a five mailings including: a pre-survey notification letter (day 1); the survey questionnaire with a cover letter (day 7); a thank you/ reminder postcard (day 14); a replacement questionnaire with a second cover letter for non-respondents (day 28); and a final thank you/ reminder card (day 42). Returned survey questionnaires were accepted over a four-month period, ending in December 2011. In order to test for non-response bias, a one page survey consisting of selected demographic and attitudinal questions was sent to all non-respondents in March 2012.

Comparing Easement and Non-easement Landowners

The first section of the questionnaire asked survey participants about their views towards private property rights and social responsibilities with regard to natural resource management (Table 2). The questions included in this part of the questionnaire were the same as questions included in the survey conducted in 2002 to compare property rights orientations of rural landowners in Texas and Utah (Jackson-Smith et al. 2005). Response data from Texas landowners in the 2002 study were used to compare attitudinal differences between our easement landowner sample and rural Texas

landowners from the Jackson-Smith et al. (2005) study group. Between group comparisons of property rights attitudes were tested using the Wilcoxon-Mann-Whitney (M-W) test, a nonparametric test allowing comparisons of ordinal response data across groups (Acock 2006).

Table 2. Property rights and responsibilities attitudinal survey questions.

Survey Questions *	**Variable Label**
Landowner Rights	
My landowner rights include the *right to exclude* others from access to my land	right to exclude
My landowner rights allow me the *exclusive use* of the natural resources provided by the land	exclusive use
My landowner rights include the *right to transfer ownership* of my land to others without restriction	right to transfer ownership
My landowner rights include the *absolute right* to do whatever I want with my land without regard for what others prefer	absolute right
My landowner rights allow me to do anything with my land so long as my actions *do not infringe upon my neighbors' rights*	no neighbor impact
My landowner rights allow me to do anything with my land so long as my actions *do not conflict with the interests and values of the local community*	no community conflict
My rights as a landowner have become *increasingly restricted* over time	rights more restricted
Landowner Responsibilities	
My landowner rights place *no obligations* on me	no obligations
My landowner rights obligate me to be a *good steward of my land* and to maintain it in good condition for future generations	good land steward
My landowner rights should obligate me to *leave the land in better shape* than when I acquired it	improved condition
Natural resources on my land *belong to society*, which allows the public to restrict land uses that cause damage to natural resources	societal resources
My landowner rights should obligate me to *take into account the values and interests of society at large*	societal values and interests

* Responses based on 7-point scale: 1=strongly disagree, 2=disagree, 3=slightly disagree, 4=neutral, 5=slightly agree, 6=agree, 7=strongly agree

Examining Intra-group Differences of Easement Landowners

To test for attitudinal differences between easement landowners, I first examined whether the questions posed in the easement landowner survey were correlated. While I separated property rights and responsibilities into a series of statements, previous research suggests that people often do not think about property rights as individual concepts but rather as multidimensional constructs (Heltberg 2002; Jackson-Smith et al. 2005; Kreuter et al. 2006). To test for collinearity, I conducted a principal components analysis (PCA) with varimax rotation on the 12 variables (Table 2). After the initial PCA analysis, orthogonal varimax rotation was applied to create indices without inter-correlated components. Cronbach's alpha (α) was used to assess the internal reliability of the summative rating scales composed of the specified variables. I relied on an α threshold of 0.700, which is widely considered the minimum for reliability in social science research (Cortina 1993; UCLA Academic Technology Services 2004). I then used the resulting variables to create ordinal logistic regression models for hypothesis testing.

Results

Respondent Profiles from the 2011 and 2002 Surveys

Of the initial sample of easement landowner survey participants (n=518), I received 18 returned questionnaires with incorrect addresses resulting in an effective survey sample size of 500. Of these 500, I received 273 responses, which included 251 completed survey questionnaires and 22 indicating respondents did not wish to participate in the study. Therefore, our effective response rate was 50% (n=251). Of the

227 abridged questionnaires sent to the non-respondents, I received 47 completed questionnaires, representing 21% of the non-response pool and 9% of the total survey sample. Subsequent analysis of non-respondents failed to find any statistically significant differences between survey participants and non-participants.

The 2002 survey sample size was also 500 landowners in Llano and Sutton county each owning a minimum of 100 acres of land. After removing disqualified ranches from the original sample frame (landowners who did not derive any income from their land), the response rate among the surveyed landowners was 64% (n=194). Follow up telephone interviews with 21 randomly selected non-respondents indicated that size of landholdings, ranching background, and levels of involvement in livestock and crop production were similar to those of the respondents (Jackson-Smith et al. 2002).

Table 3 highlights demographic differences between the two data sets. In general, the easement landowner sample included more male respondents, tended to be slightly younger, have more formal education, be less likely to live on their property, and have owned their property for less time.

Table 3. Comparative demographics of survey respondents from the 2011 easement landowner survey and the 2002 broader landowner survey conducted in Texas.

	2011 Survey (n=251)	2002 Survey (n=192)	Significance test
Gender			
Male	83%	77%	χ^2 p<0.001
Female	17%	23%	
Age	(M=62, s.d.=11.2)	(M=69, s.d.=11.8)	
25-40	3%	1%	
41-55	23%	13%	t-test p<0.001
56-65	38%	30%	
65+	36%	56%	
Education			
Less than high school	3%	5%	
High school	8%	25%	
Some post-secondary	14%	20%	χ^2 p<0.002
Bachelor's degree	30%	27%	
Graduate/professional degree	45%	23%	
Live on property			
Yes	36%	55%	χ^2 p<0.001
No	64%	45%	
Length of property ownership			
Less than 3 years	7%	5%	
3-10 years	33%	13%	χ^2 p<0.001
11-25 years	34%	9%	
25+ years	26%	73%	

Due to the primary interest of our recent study being conservation easement landowners (and the 2002 survey respondents being used as a control group), a more detailed description of the conservation easement respondents is provided. Their easement landholdings ranged in size from 5 to 30,000 acres (median=350 ac., M=1385 ac. and SD=3407.6) with 25% being 1,000 acres or more. With respect the period of ownership of the easement property, the median and mean response values were 12 and 20 (SD=22.9) years, respectively, but 38 respondents (15%) reported that the property had been in their family for over 100 years. Almost two thirds (61%) of the respondents

indicated they did not derive any income from their easement property and only 5% relied on their easement property for 25% or more of their annual income. Just over one third of the respondents (36%) lived on the easement property full time, 19% used their land as a weekend residence, and 45% were absentee landowners.

Most of the easement survey respondents (82%) were the original grantors of the conservation easement, while the others had acquired their easement property through purchase or inheritance. Of the respondents, 61% indicated that their easements were held by a non-government organization (NGO), while the others were divided between federal agency (23%) and state or local governmental agency owned easements (16%). Grantor landowners (n=43) were also asked to list their motivations easement conveyance. Their primary motivation was placed into one of five general groups (cultural protection, social responsibility, prevention of development, environmental concern, and financial gain). Concern for protecting the environment was the most commonly selected reason (47%) for conveying the easement followed by financial considerations (24%) and prevention of development (19%).

Property Rights and Social Responsibility Perspectives of Easement and Non-easement Landowners

This section provides the results of the analyses conducted to address our first two hypotheses related to differences in property rights and social responsibility orientations of easement and non-easement landowners. I wanted to see if easement landowners held fundamentally different attitudes concerning property rights [H1] and responsibilities for protecting natural resources [H2] than a more inclusive rural

landowner group. I addressed this by comparing response data from the 2011 and 2002 surveys. Both studies employed identical attitudinal questions (Table 2) to assess participants' property rights and responsibilities orientations. Because easements, by definition, alter property rights, the 2011 easement survey participants were asked to evaluate their attitudes about property rights outside of easement protected property. In other words, I wanted to know how they felt, in general, about their property rights and responsibilities. This allowed us to compare the data sets from the 2011 easement survey and the survey conducted in 2002 (Table 4).

Table 4. Median and mean response scores from the 2011 easement landowner survey and the 2002 broader landowner survey conducted in Texas.

	Median		Mean			
	2011	2002	2011	2002	% diff. in	M-W
Landowner Rights*	(n=251)	(n=192)	(n=251)	(n=192)	mean	sig**
right to exclude	7	7	**6.59**	**6.84**	**3.65%**	**<0.0001**
exclusive use	7	7	**5.85**	**6.57**	**10.96%**	**<0.0001**
right to transfer ownership	7	7	**6.09**	**6.72**	**9.38%**	**<0.0001**
absolute right	5	6	**4.25**	**5.35**	**20.56%**	**<0.0001**
no neighbor impact	6	7	**5.07**	**6.36**	**20.28%**	**<0.0001**
no community conflict	5	6	**4.74**	**5.29**	**10.40%**	**0.0018**
rights more restricted	5	6	**4.75**	**5.54**	**14.26%**	**<0.0001**
Landowner Responsibilities*						
no obligations	2	2	2.44	2.33	-4.72%	0.3063
good land steward	7	7	**6.01**	**6.69**	**10.16%**	**<0.0001**
improved condition	6	7	**4.91**	**6.14**	**20.03%**	**<0.0001**
societal resources	2	1	**2.87**	**1.91**	**-50.26%**	**<0.0001**
societal values and interests	4	4	3.97	3.87	-2.58%	0.5162

* Answers based on 7 point scale 1=strongly disagree, 2=disagree, 3=slightly disagree, 4=neutral, 5=slightly agree, 6=agree, 7=strongly agree. ** Bolded values are significantly different at $p<0.05$, based on Mann-Whitney (M-W) rank test

On average, both easement-encumbered landowners and the broader group of landowners who generated some income from their land, expressed strong to very strong attitudes concerning traditional property rights, particularly the concepts of exclusion, exclusivity and transferability. However, they were less likely to strongly agree with statements about absolute unrestricted rights. Furthermore, respondents expressed slightly more concern about not infringing on their neighbors' rights than preventing conflicts with the local community.

Comparing the mean response values of the two groups of survey respondents, those with conservation easements expressed significantly weaker property rights orientations in every category tested (3.65%-20.56% percent lower scores), thereby broadly corroborating our first hypothesis (H1). The greatest difference was measured in response to the concept of absolute property rights. Landowners with conservation easements were much less likely to agree (20.56%) that their property rights include the "absolute" right to do anything with their land without regard for the preferences of others. Paradoxically, non-easement landowners were more likely (20.28%) to agree with the idea that their property rights allowed them do anything on their land, so long as it does not infringe on their neighbors rights.

Under the landowner responsibilities categories, respondents in both surveys disagreed equally with the statement, "my landowner rights place no obligations on me", suggesting they feel some responsibility to manage their land in a manner that does not harm others. However, respondents from both groups also disagreed with statements that

natural resources belong to society and that resource management on their land should *consider the needs of society at large.*

Easement landowners were 50.26% less strongly opposed to the idea that natural resources are social assets. In contrast to this, the broader rural landowner group was significantly more likely to agree than conservation easement landowners that they have a responsibility to be a *good land steward* (10.16%) and *leave the land in better shape* (20.03%) than when they acquired it. Accordingly, I found no consistent evidence to support our second hypothesis (H2) that easement landowners would express a greater sense of responsibility than non-easement landowners towards protecting natural resources on their property.

Intra-group Easement Landowner Differences

After analyzing inter-group differences between easement and non-easement landowners, I examined differences within the easement landowner group to test the last two hypotheses, which relate to property rights orientation differences between easement-granting landowners and subsequent easement landowners (H3) and between women and men (H4). First, I tested for potential collinearity between the survey items listed in Table 2 using PCA analysis. Of the four potential factors identified in the preliminary PCA analysis (Table 5), only two of them (Factor 1 - responsible rights and Factor 3 - land stewardship) produced a Cronbach's score > 0.700, which is the minimum value to justify their use as latent dependent variables in the subsequent regression models. The remaining variables in Factor 2 and Factor 4 and one variable

(no obligations) did not load on any factor. They were incorporated as standalone dependent variables in the subsequent analyses.

Table 5. Principal components analysis of easement landowner property rights and responsibilities response variables, showing rotated factor loadings.

	Rotated factor loadings	
Landowner Rights	*Factor 1* (α=0.7582)	*Factor 2* (α=0.4896)
right to transfer ownership	**0.5182**	0.4464
absolute right	**0.5873**	0.5218
no neighbor impact	**0.6855**	0.4664
no community conflict	**0.7447**	0.0608
rights more restricted	**0.7051**	-0.0583
right to exclude	-0.0537	**0.8142**
exclusive use	0.2980	**0.7546**
	Factor 3 (α=0.8300)	*Factor 4* (α=0.6015)
Landowner Responsibilities		
no obligations [a]	-0.5864	-0.1285
good land steward	**0.9102**	0.0642
improved condition	**0.6924**	0.3392
societal resources	-0.0222	**0.8889**
societal values and interests	0.3536	**0.7518**

[a]- variable did not load on either factor, was excluded from the PCA analysis for this section and used as a stand-alone variable in regression modeling

The two latent variables (Factor 1 – responsible rights, and Factor 3 – land stewardship) and five stand alone variables (right to exclude, exclusive use, no obligations, societal resources, societal interest) were used as *dependent variables* in seven ordinal logistic regression models to test the two hypotheses about intra-group differences among easement landowners. Two of the seven regression models (Factor 3 – land stewardship, and no obligations) were statistically significant (Table 6). In both

regressions, gender was a significant explanatory variable indicating that gender plays a significant role in easement landowners' attitudes regarding property rights; this corroborated H4. Women were 71% more likely to agree than men with the idea that landownership obligates them to be good land stewards. By contrast, men were 309% more likely than women to agree with the statement, "my landowner rights place no obligations on me". Part-time residency was also found to be positively correlated with an increased land stewardship ethos; specifically, weekend residents were 113% more likely than absentee landowners to agree with statements about an obligation to be a good land steward, whereas there was no difference in this regard between full-time residents and absentee owners of conservation easement-encumber land. None of the seven models found any statistically significant response differences between grantor and successive generation landowners with regard to their property rights orientations, thereby providing no support for H3. In addition, I did not find that age, education or dependence on the property for income significantly influenced property rights or responsibilities attitudes of our easement landowner respondents.

Table 6. Demographic factors influencing easement landowners' property rights and responsibilities attitudes. Bolded results are significant at p<.05.

	Good land steward model P<0.002		*No obligations model P<0.024*	
Explanatory Variables	p-value	% Δ in odds	p-value	% Δ in odds
Grantor landowner (1=yes, 0=no)	0.140	-39.4	0.728	13.5
Respondent age	0.752	-0.4	0.470	-0.9
Years of education	0.286	-4.5	0.428	3.4
Gender 1=male, 0=female	**0.001**	**-71.0**	**0.001**	**309.3**
Full time CE Resident*	0.382	30.2	0.318	36.6
Weekend CE Resident*	**0.023**	**113.8**	0.070	-47.5
Annual income from CE property= 1-25%†	0.142	50.2	0.594	16.2
Annual income from CE property= >26%†	0.371	83.5	0.308	89.8

** Absentee landowner is reference group*
† Annual income from CE property= 0% is reference group

Discussion

The results of this research confirmed our original hypothesis that landowners with conservation easements would hold different attitudes concerning property rights compared to non-easement landowners. Landowners owning easement-encumbered property have intentionally relinquished some of the rights associated with that land. They have, in essence, transferred "sticks" from their bundle of rights to another. This transference of rights alters the right of exclusivity (exclusive use) contained within traditional property rights. Because of the divided ownership interest, many properties encumbered with conservation easements have characteristics common to communal property arrangements. The conservation easement fundamentally changes the

landowner's individual property rights into a shared right. One example of this is when an easement requires a management plan, which is often negotiated (and subject to renegotiation) between the landowner and the easement holder. It is possible easement landowners land management decisions are affected not only by the restrictions contained in the conservation easement but also by landowner attitudes about their diluted rights as well as their relationship with their easement owning partner.

Understanding and applying lessons learned from other successful communal natural resource management models has the potential to enhance both the management and governance of conservation easements (Schlager and Ostrom 1992). An examination of other studies describing variables common to successful communal socio-ecological systems (SES) can provide valuable insights applicable to easement landowner/easement holder relationships. Two in particular: 1) shared knowledge of SES and 2) predictability of system dynamics are often cited as important for successful communal management and are easily incorporated into conservation easement programs (Ostrom 2009). Shared knowledge of SES requires two-way communication between easement landowners and easement holders sharing information about the current state of the SES and how any prescribed actions may affect their property. In addition, users (i.e. landowners and easement holders), need to be able to estimate the effects of any land management actions. Conservation easement landowners and easement holders working together on knowledge and system predictability issues has the potential to not only strengthen social networks but enhance management of the easement-protected resources, increase

the conservation outcomes of conservation easements and minimize potential conflicts between landowners and easement holders.

Given that easement landowners have relinquished a significant portion of their property rights in a way that provides significant conservation benefits to society at large, it may seem counterintuitive that easement landowners scored lower than non-easement landowners in the social responsibility categories, particularly in categories measuring their land stewardship ethos. These attitudinal differences may be attributable to landowners with easement-encumbered properties feeling that they have already contributed to their community via the easement restrictions. Several previous studies have shown that easement landowners' primary motivation for easement conveyance is altruism (Farmer, Knapp, et al. 2011; Brenner et al. 2013; Rilla 2002; Wallace et al. 2008; Ernst and Wallace 2008). Upon closer examination, it appears that while easement landowners do feel obliged, particularly with respects towards managing natural resources in a socially responsible manner, they also feel strongly that the resources on their land ultimately belong to them. The concept of protecting natural resources occurring on their private land for the benefit of society as a whole may cause "compassion fade", whereby a perceived increasing need for environmental protection causes flattening or decreasing concern for environmental conservation (Markowitz et al. 2013). Furthermore, landowners may identify less strongly with broader society than they do with more proximate groups of people, such as their local community or the future generations of their own family, with whom they feel greater kinship (Lickel et al. 2000; Markowitz et al. 2013).

In addition, previous research on easement landowners has focused on NGO easement programs (Farmer, Knapp, et al. 2011; Rissman and Sayre 2012). However, given the prevalence of government-held easements throughout the U.S., including them in conservation easement research is important in order to provide a robust understanding of perpetual easement programs. The respondent sample in this study included a significant proportion (~39%) of government-held easements, which are usually purchased by the agency from the landowner rather than being donated by the landowner. Financial considerations were the second most cited motivation for easement conveyance in our study sample. It is possible that including purchased easements in the study shifted the underlying motivations of the sample away from altruism and towards monetary incentives which may account for their lower societal responsibility scores (Ernst and Wallace 2008; Cross et al. 2011).

Despite finding no significant difference between grantor and successive generation easement landowners with respect to property rights orientations, there is reason to expect that, over time, those differences may become more apparent. Grantor landowners voluntarily relinquished their property rights to a third party. However, for successive generation landowners, the sense of "voluntariness" or conservation-related intentions driving the original transaction, may diminish significantly over time (Cheever 1996). Landowners with strong property rights orientations, as expressed in our study population, may feel increasingly disenfranchised by the rights restrictions imposed by conservation easements, which may lead to increasing conflict between landowners and easement holders and ultimately undermine the effectiveness of the land

protections that conservation easements provide (Cheever 1996). As land ownership changes hands, new landowners, who do not directly benefit from the upfront incentives of the easement, may be less enthusiastic about conservation easements and less interested in adhering to their constraints. One informal survey reported in 2000 found that out of 21 litigated conservation easement violations, 19 were committed by subsequent generation landowners who did not grant the easement (Danskin 2000). Another study from 2008 found that the rate of easement violations was increasing and that successive generation landowners were involved in the majority of conservation easement legal challenges (Rissman and Butsic 2011). The Land Trust Alliance, an umbrella group supporting the land trust community, has indicated that the biggest challenge faced by land trusts in the future will be their inability to defend easements. Understanding property rights attitudes of both grantor and successive generation landowners can help easement holders incorporate this information into their strategies to help build strong relationships with their partner landowners. For example, allowing landowners greater autonomy in making adaptive management decisions may not only foster increased land management investments but may also increase landowners' sense of control over their retained rights.

Previous research has shown that women tend to be more satisfied with both their conservation easement and the relationship with their easement holding organization (Stroman and Kreuter 2014). This study provides additional evidence that women's attitudes concerning socially responsible natural resource management may translate into greater acceptance using property rights adjustments (e.g. conservation easements) as a

long-term land protection mechanism. This suggests that outreach efforts designed specifically to include women may prove more successful.

While this report provides evidence of how adjustments in private property rights interact with attitudes and beliefs, there are several study limitations that should be addressed. Most importantly, while I used identical attitudinal survey questions to obtain property rights and responsibilities data, the two mail survey samples may not be directly comparable. First, the two data sets used for comparison were obtained nine years apart (2002 and 2011) and property rights are a social construct that may change over time. Second, whereas the 2002 data set related to landowners in just two counties, the 2011 data set was derived from easement-encumbered landowners across Texas. Therefore, the geographic scales of the two samples differ. Additionally, I found that the two sets of participants from the two respondent groups differed significantly in distribution with respect to respondents' gender, age, level of education, place of residence, and period of property ownership. Previous research has found that all of these same demographic indicators (excluding gender) affect property rights and responsibilities attitudes (Jackson-Smith et al. 2005). These limitations highlight the need for future research incorporating more direct comparisons between landowners with and without conservation easements.

While conservation easements enjoy strong legal protections against infractions, maintaining landowner support is critical in the long term for sustaining easements as a viable protection tool. Property rights attitudes and beliefs have been found to influence easement conveyance (Kabii and Horwitz 2006) but they may also influence landowners

support for easements already in place. Easement holders should consider the property rights orientations of current and potential future owners of easement-encumbered properties, as these may change over time, and incorporate that information into their programmatic decision-making. If easements do not succeed in meeting both societal needs for mainlining ecosystem integrity, to ensure the continued delivery of critical ecosystem services, and the goals of landowners living with easements, landowners attitudes towards conservation easements may become increasingly negative over time. The implications of this are potentially far reaching. If current easement landowners are increasingly dissatisfied with the property rights restrictions in their easements, it is likely that the frequency of easement violations and legal challenges will continue to increase, costing both landowners and easement holders significant expenditures in legal fees, staff time, mitigation and restoration work. Furthermore, increasing easement conflicts may depress the willingness of landowners considering conveying a conservation easement.

CHAPTER III

PERPETUAL CONSERVATION EASEMENTS AND LANDOWNERS: EVALUATING EASEMENT KNOWLEDGE, SATISFACTION AND PARTNER ORGANIZATION RELATIONSHIPS[*]

Overview

Conservation easements are being more widely used to facilitate permanent land conservation. While landowners who initially place a conservation easement on their land are generally highly motivated to protect the conservation values of their land, changes in landownership may hinder long-term active landowner support for these easements. Maintaining such support is critical for ensuring their effectiveness as a conservation tool. Our research reports on results from a mail survey sent to landowners in Texas who own property encumbered with perpetual conservation easements. They were asked about their attitudes concerning their conservation easement and their relationship with the easement holder. I also examined institutional aspects of easement holding organizations and variables associated with landownership that affected these attitudes. Among institutional factors, frequency of contact between landowners and easement holders and the category of agency (federal, state and local or non-governmental agency) were significant in determining level of satisfaction with the easement and perceived relationship with the easement holder. Landowner factors

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affecting these same issues included easement grantor or successive generation landowner, gender and motivations driving landownership. Management implications from this study suggest that easement holders should increase staff capacity capable of providing targeted landowner technical assistance and outreach beyond compliance monitoring. Additionally, landownership motivations should be considered by easement holders when deciding whether to accept an easement. Finally, expressed dissatisfaction with federal governmental easement holding institutions should be explored further.

Introduction

Effective conservation of natural resources on private lands is critical throughout the United States (U.S.) because private property is the dominant form of landownership and many ecosystem services needed for the well-being of current and future generations are derived from them. Even in states that have large swaths of public land, private lands provide many important ecosystem services, including high value targets, such as endangered species habitats (Wilcove et al. 1996). Conservation easements have evolved to become a leading tool for implementing long-term conservation on privately owned rural lands in the U.S., especially for protecting biodiversity (Rissman et al. 2007; Merenlender et al. 2004). By 2010, approximately 8.8 million acres in the U.S. were protected under easements held by non-governmental organizations (NGO's), up from just 2.3 million acres in 2000 (Chang 2011). This does not include an estimated 12 million acres of easements held by federal, state and local governmental agencies (Pidot 2005). Furthermore easements, as a land protection mechanism are increasingly used internationally throughout North America, New Zealand, Australia, Europe and Latin

America (Kabii and Horwitz 2006; Adams and Moon 2013; Saunders 1996; Rissman et al. 2007).

Previous research on conservation easements has examined the spatial distribution patterns of conserved lands and the types of development allowed on easement properties (Merenlender et al. 2004; Rissman et al. 2007; Kiesecker et al. 2007). In addition, numerous publications offer prescriptive guidance for establishing and negotiating conservation easements (Gustanski and Squires 2000; Lindstrom 2008; Byers and Ponte 2005). However, only within the last decade have there been any substantial attempts to empirically evaluate the ecological efficacy of perpetual conservation easements and minimal research has been conducted to determine the social implications of establishing them (Kabii and Horwitz 2006; Alexander and Hess 2012; Pocewicz et al. 2011; Rissman and Sayre 2012; Wallace et al. 2008).

While some studies have included landowners whose property was encumbered with perpetual conservation easements, limited research has specifically targeted such landowners to obtain a clear understanding of factors affecting landowner perspectives about their easements. In 1997, Feinburg and Luzadis (1997) conducted a survey of landowners in the Northeast U.S. whose conversation easements were held by four non-profit organizations and one state agency. They found that, in general, landowners who conveyed the easement (i.e. grantor landowners) were highly satisfied with their easement and were not motivated to grant it primarily for financial reasons. They also concluded that successive generation landowners were satisfied with their knowledge of easement restrictions but expressed a desire for more ongoing contact with their

easement holding organization. Furthermore, they reported that 37% of successive generation easement landowners would, given the option, amend their easement, compared with just 19% of grantor landowners (Feinberg and Luzadis 1997). Rilla (2002), who interviewed 47 conservation easement landowners in California, found that their primary motivations for selling an easement were land preservation and economic considerations. Farmer et al. (2011) , reporting on the results of a mail survey of 187 Midwestern easement landowners, specifically examined landowner motivations driving easement conveyance. They found that place attachment and "contributing to the public good" both appeared to be strong drivers for landowners granting an easement, while financial incentives were the lowest ranked motivational factor (Farmer, Chancellor, et al. 2011).

In this study, I look beyond motivational factors associated with easement conveyance. While conveyance of easements may be a necessary first step for protecting land from fragmentation and development, this is inadequate to ensure long-term maintenance of the ecosystem processes needed to meet the conservation goals of perpetual easements. To address the limitations of previous work and to contribute to theory regarding effective long-term conservation of private land encumbered by conservation easements, our research addresses the following question: *What factors are likely to enhance the future effectiveness of easements?* To answer this question I report findings about landowner responses regarding their *knowledge* about and *satisfaction* with their conservation easement as well as the *relationship* that they have with the easement holding organization.

I do this by postulating the following hypotheses: *Easement Knowledge* – [H1] Level of landowners' *knowledge* about the terms of their easement decreases with time since conveyance of the easement; and [H2] Landowners who originally granted the conservation easement (grantor landowners) are more *knowledgeable* about their easement than landowners who did not grant the easement (successive landowners). *Satisfaction* –[H3] Level of *satisfaction* of landowners with their easement is negatively correlated with the time since the easement was conveyed; [H4] Easement grantor landowners are more *satisfied* with their easement than successive generation landowners; [H5] Landowners who use their land to generate income through farming, ranching or mineral extraction or who own it as a financial investment are less *satisfied* with their easement and their relationship with their easement holder than landowners who use their land mainly for recreational purposes; and [H6] Landowners who live on their land are less tolerant of conservation easement-related land use restrictions and, therefore, are less likely to be *satisfied* with their easement than absentee landowners. *Relationship with easement holding entity* – [H7] Landowners' perceived *relationship* with their easement holding institutions is positively associated with the frequency of contact (social exchange) between them (Cropanzano and Mitchell 2005; Cross et al. 2011); and [H8] Landowners easement satisfaction and *relationship* with their easement-holder is better when the easement holding institutions are private non-profit organizations (e.g., land trusts), than if they are public entities (i.e., local state or federal agencies). Because most public easement programs are purchased, rather than donated easements, I expect that the financial consideration provided will not provide long-term

satisfaction. Conversely, most private easement holding organizations rely on donated easements, where the potential goal conflict between landowners and easement holders may be lower (Rissman and Sayre 2012).

Methods

Study Area and Survey Sample

The study consisted of all landowners in Texas whose property was encumbered with a permanent conservation easement in 2010. Texas, a very large (696,241 km^2), centrally-located state shares cultural and ecological commonalities with eastern, central and western portions of the United States and northern Mexico (Figure 3). Furthermore, it has diverse land use patterns.

To develop the easement landowner database, I contacted all private and public easement-holding institutions in Texas. Ultimately I included 518 easement landowners associated with 33 easement-holding organizations. Sixteen entities provided contact information for 429 landowners. Sixteen other easement holders declined to provide the landowner contact lists but, using public county records, I was able to obtain contact information for 69 landowners with conservation easements who were associated with these organizations. Finally, one NGO, representing 20 landowners, did not wish to provide member contact information but instead participated in the study by concurrently mailing survey items directly to its members. Some organizations indicated that specific landowners did not wish to be included in our study and, accordingly, they were excluded from the study sample.

Mail Survey

A mail survey questionnaire was developed based on a literature review and in consultation with key informants from easement-holding organizations and some landowners. The questionnaire was tested and refined through informal focus group meetings consisting of land conservation professionals and conservation easement landowners. The mail survey questionnaire included 78 questions addressing four areas of inquiry: private property rights and responsibilities, land management activities on easement properties, easement-specific issues, and landowner demographics. The survey was initiated in September 2011. It was administered using a five-phase mailing protocol (Dillman 2000). This protocol consisted of: day 1 - pre-survey notification letter informing the participants about the study and indicating the value to them of participating in it; day 7 - survey questionnaire with cover letter and a postage-paid return envelope; day 14 - reminder/thank you postcard; day 28 - replacement questionnaire with cover letter and another return envelope to non-respondents; and day 42 - final reminder/thank you postcard. Survey responses were accepted for up to four months from the date of the first mailing of the survey. An abbreviated questionnaire including a limited number of attitudinal and demographic indicator questions was mailed in March, 2012 to all survey non-respondents to test for non-response bias.

Data Analysis

Survey data were entered into a Microsoft Excel spreadsheet and analyzed using STATA 12.0 (StataCorp 2011). Statistical analyses included descriptive statistics for demographic data, t-tests for non-response bias testing, principle components analysis

(PCA) for variable reduction, and multivariate ordinal logistic regression modeling and analysis for hypothesis testing. Multivariate ordinal logistic regression models were used to analyze the relationship between three dependent variables and several independent variables. The dependent variables were related to (1) landowner knowledge of and (2) satisfaction with their conservation easement and (3) the landowner relationship with their easement holding organization. Ordinal logistic regression was used because the dependent variables were quantified using seven point Likert-type response scales and this approach avoids the assumption that the distances between response options are equal (Long and Freese 2006). Participants were also given the opportunity to include additional comments at the end of the survey, some of which were used for discussion purposes.

Results

Of the 518 identified survey participants, I received 18 returns due to incorrect addresses resulting in an effective survey sample size was 500. Of the surveys distributed, I received 273 responses, 251 of which included completed survey questionnaires and 22 indicating respondents did not wish to participate. This translates into a 50% useable response rate. Of the 227 abridged questionnaires sent to the non-respondents, 47 completed questionnaires were received, representing 21% of the non-response pool and 9% of the total survey sample. Analysis of the abbreviated non-respondents survey did not find any statistically significant differences between survey participants and non-participants.

Respondent Profiles

The survey respondents were predominantly male (83%), their average age was 62 years (SD = 11.19, range = 35 to 88 years), and their formal education averaged 16.4 years (SD = 3.16, range = 5 to 27 years). Eighty-two percent of the respondents had granted the original easement, 36% of the respondents resided full-time on their conservation easement property, 19% were weekend residents and 45% were absentee landowners. In combination, the survey respondents held 328,148 total acres under easement. The size of easement properties ranged from 5 to 30,000 acres, with a median of 350 acres (SD=3407.6). The average period of property ownership also ranged widely from one to 165 years, with 38 respondents (15%) reporting that the property had been in their family for 100 years or more, and the median ownership period being 12 years. Of the respondents, 61% reported earning no income from their easement-encumbered property, 34% reported earning up to 25% of their income from it, and only 5% reported earning more than 25% of their income from it. This indicates that, in general, landowners with easement-encumbered properties do not rely substantially on that property for income generation.

The survey responses included easements held by 26 of the 33 easement-holding organizations in Texas. The seven easement holders not represented in our survey responses were all small organizations that collectively hold approximately 13 easements. Responses included easements located throughout the study area (Figure 3).

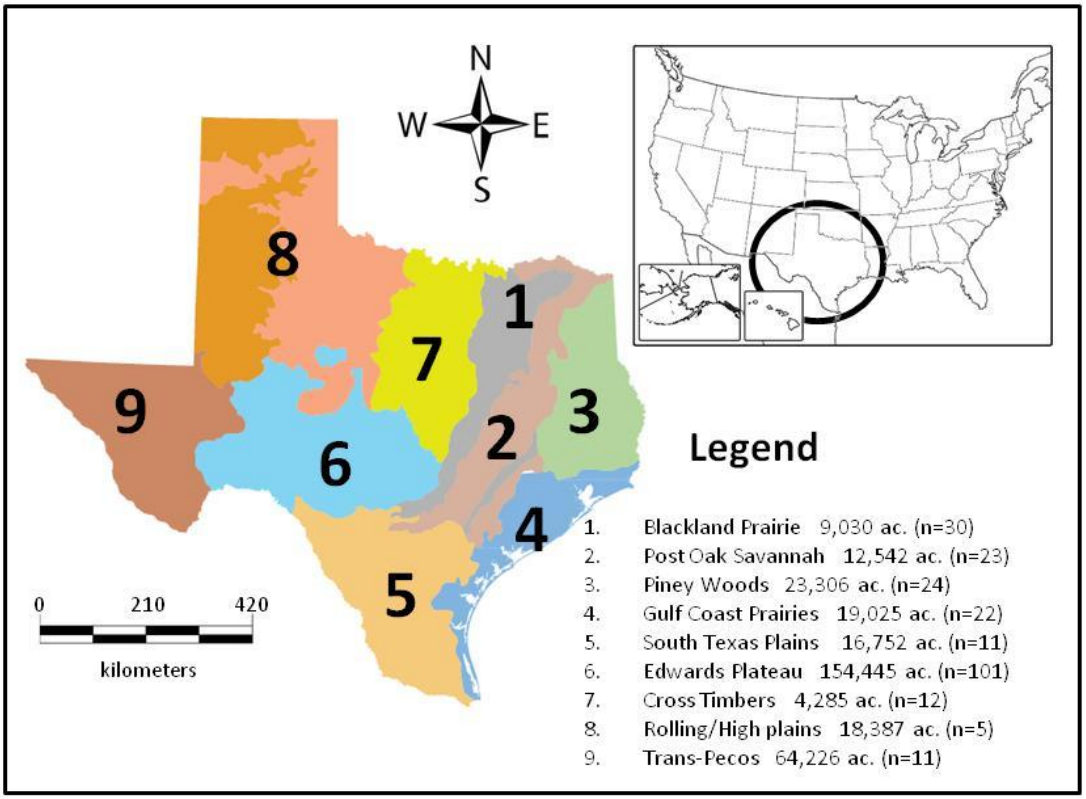

Figure 3. Map of study area. Acreage under easement reported by survey respondents (n) by Gould ecoregion (Gould et al. 1960). Rolling Plains and High Plains were combined due to substantial overlap of easement properties between ecoregions.

The Edwards Plateau ecoregion produced the highest number of responses (n=101) and while the Trans-Pecos ecoregion only produced 11 respondents, it had the second largest acreage total. This is likely due to the larger average land parcel size in that region (Wilkins et al. 2009).

Regression Model Development

In order to reduce the number of both dependant and explanatory variables and simplify our regression models, I conducted a principal components analysis (PCA) with varimax rotation for two sets of survey items: 1. Issues relating to conservation easements; and 2. Reasons for owning the land. PCA identifies variables that exhibit high collinearity allowing interrelated variables to be combined into additive indices or factors (Treiman 2009). After the initial PCA analysis, orthogonal varimax rotation was applied to create indices without inter-correlated components. Finally, Cronbach's alpha coefficients were derived to assess the internal consistency of a summative rating scale composed of the specified variables. Scales with Cronbach's $\alpha > 0.70$ are generally considered acceptable for social science research purposes (UCLA Academic Technology Services 2004).

PCA results from the section of the survey asking landowners specific questions about their conservation easements yielded two distinct factors (Table 7).

Table 7. Rotated factor loading results of PCA analysis on conservation easement (CE) specific issues with Cronbach's α of internal reliability. (Factor I = Knowledge, Factor II = Satisfaction)

Variable	**Factor 1 Knowledge** ($\alpha = 0.7932$)	**Factor 2 Satisfaction** ($\alpha = 0.8287$)
I remember my CE	**0.8243**	0.2417
I understand my CE	**0.8882**	0.2091
I know who to contact about my CE	**0.7228**	0.1167
I would grant additional CE's	0.143	**0.8636**
I am happy to comply with the CE	0.321	**0.7605**
I would **not** terminate my CE	0.170	**0.8779**

Factor I represents landowners' self-reported knowledge about their easement and factor II represents landowners' expressed satisfaction with their easement. A third variable from the same section of the survey is a standalone variable representing the landowners opinion about the relationship between the landowner and the easement holder. These three variables were used as dependent variables in the regression models.

I also conducted a PCA analysis for 14 variables related to reasons for landownership. In this set of survey questions, landowners were asked to rate the importance of a variety of reasons for owning their easement property including: financial investment, generating a profit from the land, selling the land for profit, farming/ranching, hay/forage production, livestock production, crop cultivation, outdoor enjoyment, relaxation, non-consumptive recreation, recreational hunting/fishing, commercial hunting, wildlife management or mineral extraction. For the landownership section, PCA yielded three factors with an acceptable Cronbach's alpha score which were used as independent variables in our regression models: farmer/rancher (α=0.8220), recreation (α=0.7181) and investment (α=0.7495). These three factors were included as independent variables in some of our regression models. A fourth factor, composed of variables related to hunting and fishing was deemed unreliable due to a low Cronbach's alpha score (α=0.4414).

In addition to the PCA indices, Table 8 includes a descriptive list of all of the independent variables used in the regression models.

Table 8. List of explanatory variables used in regression analysis models.

Variable Labels	Variable Descriptions
Landownership Characteristics	
Age in 2011	Landowners age in 2011. Continuous single item variable
Gender	Binary single item variable; 1=male, 0=female
Years of education	Landowners number of years of education. Continuous single item variable
Age of conservation easement	Number of years since easement conveyance. Continuous single item variable
Grantor landowner	Landowner granted the easement. Binary single item variable; 1=yes, 0=no
Income from CE = 1-25%[a]	Percentage of annual income derived from easement property. Binary single item variable
Income from CE > 25% [a]	Percentage of annual income derived from easement property. Binary single item variable
Weekend resident	Binary single item variable; full-time resident is reference category
Absentee landowner	Binary single item variable; full-time resident is reference category
Farmer/rancher landowner	PCA index variable representing farming and/or ranching as primary reason for CE landownership
Recreation landowner	PCA index variable representing recreation as primary reason for CE landownership
Investment landowner	PCA index variable representing financial investment as primary reason for CE landownership
Institutional Characteristics	
fedgovt [b]	Easement holder is a federal government agency
Statelocalgovt [b]	Easement holder is a state or local government agency in Texas
Interact Never [c]	Frequency of interaction between landowner and easement holder (Never)
Interact < once per year [c]	Frequency of interaction between landowner and easement holder (Less than once per year)
Interact once per year [c]	Frequency of interaction between landowner and easement holder (Once per year)
Never accompany staff visits[d]	Landowner accompanies easement holder staff on monitoring visits (No)
Sometimes accompany staff visits[d]	Landowner accompanies easement holder staff on monitoring visits (Sometimes)

[a] Income from CE (conservation easement) = 0% used as reference category.

[b] NGO is reference category.

[c] Interact >once per year (more than one interaction per year between landowner and easement holder) used as reference group

[d] Always accompany staff on visits (landowner always accompanies easement holder staff on monitoring visits) used as reference group

Regression Results

Table 9 presents the results of the three regression models analyzing landowners' easement knowledge and their reported satisfaction with their easement and their easement holding organization.

I hypothesized that landowners who originally conveyed their easement were more *knowledgeable* about the terms of their easement than successive landowners and that this knowledge declined with time since easement conveyance [H1 and H2]. Our study failed to corroborate either of these hypotheses. Rather, I found the only factor that seemed to influence knowledge about the easement was gender; female respondents were more likely to report that they were familiar with the terms of their easement. However, I should note that the easement knowledge questions simply asked landowners how well they felt that they remembered and understood their easement and if they knew who to contact if they had questions about their easement. Our survey did not have a mechanism to determine if they were correct in their self-assessment. Furthermore, the easement knowledge regression model itself was not significant ($P= 0.117$) making any inferences drawn from the findings moot.

Table 9. Results of ordinal logistic regression analysis for conservation easement (CE)- dependent variables including knowledge of and satisfaction with conservation easement and relationship with the easement holder. (Bolded results are statistically significant at P <0.05; † results significant at P <0.10).

Independent Variables	***Knowledge*** *model P=0.117*			***Satisfaction*** *model P<0.001*			***Relationship*** *model P<0.001*		
	β coeff.	p-value	% Δ odds	β coeff.	p-value	% Δ odds	β coeff.	p-value	% Δ odds
Age of CE	0.036	0.204	3.7	-0.035	0.200	-3.5	**-0.081**	**0.011**	**-7.8**
Grantor landowner	-0.375	0.422	-31.3	**1.509**	**0.002**	**352.4**	**1.258**	**0.007**	**251.9**
CEI=1-25% [a]	-0.57	0.112	-43.5	-0.245	0.469	-21.8	**-1.087**	**0.007**	**-66.3**
CEI>25% [a]	-0.164	0.841	-15.2	0.150	0.853	16.2	-1.296	0.115	-72.6
Weekend resident [b]	0.468	0.291	59.8	0.431	0.331	53.9	0.255	0.600	29.2
Absentee landowner [b]	0.522	0.126	68.5	0.386	0.266	47.2	0.632	0.105	88.3
Farmer/rancher owner	0.155	0.411	16.8	-0.144	0.431	-13.4	-0.018	0.931	-1.8
Recreation landowner	0.130	0.411	13.9	**0.486**	**0.004**	**62.6**	**0.344**	**0.032**	**41.1**
Investment landowner	-0.179	0.258	-16.3	**-0.582**	**0.000**	**-44.1**	**-0.420**	**0.014**	**-34.3**
Years education	0.003	0.946	0.3	0.025	0.584	2.5	-0.040	0.446	-4.0
Gender	**-0.972**	**0.019**	**-62.2**	-0.787	0.058	-54.5†	**-1.266**	**0.021**	**-71.8**
Age in 2011	-0.020	0.152	-1.9	**0.030**	**0.022**	**3.0**	0.002	0.888	0.2
Federal government [c]	-0.182	0.535	-16.7	**-1.599**	**0.000**	**-79.8**	**-1.378**	**0.000**	**-74.8**
State or local government[c]	0.077	0.820	8.0	0.384	0.258	46.8	-0.251	0.468	-22.2
Interact never [d]	1.037	0.409	182.3	**-2.608**	**0.065**	**-92.6†**	**-2.917**	**0.011**	**-94.6**
Interact < once per year [d]	-1.258	0.105	-71.6	0.840	0.242	131.8	**-2.322**	**0.003**	**-90.2**
Interact once per year [d]	-0.209	0.413	-18.9	**-0.928**	**0.000**	**-60.5**	**-1.057**	**0.000**	**-65.3**
Never accompany staff visits [e]	-0.046	0.903	-4.6	-0.368	0.373	-30.8	-0.503	0.224	-39.6
Sometimes accompany staff visits [e]	-0.382	0.154	-31.8	-0.214	-0.422	-19.3	-0.391	0.187	-32.4

[a] Income from conservation easement (CEI) = 0% is reference category
[b] Full time resident is reference category
[c] NGO is reference category
[d] Interact > once per year is reference category
[e] Always accompany staff visits is reference category

The *satisfaction* and *relationship* models showed similar explanatory patterns. Results from both models indicate that landowners who initially granted the conservation easement (grantors) were 352% (3.5 times) more likely to report satisfaction with their easement and 251% (2.5 times) more likely to report having a good relationship with their easement holder than successive landowners. These findings support our hypothesis [H4] that grantor landowners are more satisfied with their easement than successive landowners. Our hypothesis that satisfaction with the easement would decrease over time [H3] was not substantiated. Landowners primary land use [H5] was significant, but only for investment landowners and recreational landowners. Those who own their easement property primarily for recreational purposes expressed significantly more satisfaction (62% more likely to report easement satisfaction) with their easement than landowners who own their land for other purposes. By contrast, landowners who own their property primarily as a financial investment were 44% less likely to be satisfied with their conservation easement than landowners who owned the property for other purposes. Similarly, recreational landowners were 41% more likely and investment landowners were 34% less likely to report having a good relationship with their easement holders than landowners who owned their property primarily for other reasons. Contrary to our assumptions, whether or not the landowner lived on the easement property [H6] did not impact their easement satisfaction.

Interaction frequency [H7] was also found to be a significant factor for explaining differences in both the satisfaction and relationship models. Landowners who interacted with their easement holder once per year or less were generally more

dissatisfied with the easement and their relationship with their holder organization than those who interacted with their easement holding organization more frequently. The models indicate that as the frequency of interaction increased, landowner dissatisfaction with their easement decreased. In other words, increased contact between landowners and easement holders seems to increase landowner's satisfaction with both their easement and with their easement holder. In addition, the categories of easement holder [H8] were significant both in terms of landowner satisfaction with the easement and the relationship with the easement holder. Landowners whose easement was held by a federal agency were 79% more likely to express dissatisfaction with the easement itself and 74% more likely to express dissatisfaction with their relationship with their easement holder than landowners whose easement was held by an NGO. Landowners with easements held by a state or local governmental agency were not statistically different from NGO-partnered landowners either with respect to easement satisfaction or relationship with their easement holder. Landowner age and gender were additional factors predictive of easement satisfaction, with older landowners and women being significantly more likely to convey overall satisfaction with their easements.

Additional explanatory variables not captured in the satisfaction models but significant in the relationship model included the age of the easement (or number of years since easement conveyance) and landowners who derive 25% or less of their annual income from their easement property. Based on our study, landowners' relationship with their easement holder declines over time and landowners who derive 25% or less of their annual income from their easement property are less likely than

those who derive no income from their land to report having a good relationship with their easement holder.

Discussion

Based on previous research and other rationale, I hypothesized that a number of landowner characteristics and easement holder factors would influence landowners' knowledge about and satisfaction with their easement and their relationship with the easement holder. I found limited evidence of factors affecting landowners' knowledge of their conservation easement. However, I uncovered overlapping influences relating to landowner satisfaction with their easement and the relationship with their easement holder. Specifically, our research corroborated that (1) ownership for recreation, (2) grantor versus successive landowner, (3) increased institutional contact and (4) institutional type significantly influence landowners' satisfaction with their easement and landowners' perceived relationship with their easement holder. Each of these factors is discussed below.

(1) In both the satisfaction and relationship models, landowners who owned their property primarily for recreational purposes were happier with their conservation easement than landowners who own their property primarily for other purposes, particularly if the property was owned primarily for financial investment purposes. This may be attributable to the fact recreational owners are less likely to be inconvenienced by development or land subdivision restrictions than other landowner groups. Easement restrictions tend to impact recreational uses less decreasing the potential for conflict on recreational properties (Rissman et. al 2007). This argument is bolstered by the

corresponding negative attitudes about easements reported by landowners who owned their property primarily for investment purposes. In addition to use restrictions, based on some of the comments from survey respondents, I suspect that actual or perceived reductions in the value of easement properties are contributing to these observed attitudes.

(2) The grantor versus successive landowner effect was a statistically significant explanatory variable in both the satisfaction and relationship models. Many conservation practitioners working with easements have long suspected that successive generation landowners may harbor negative attitudes about their easements (Feinberg and Luzadis 1997; Pidot 2005). Our research provides empirical evidence that supports those concerns; I identified that successive generation landowners are significantly less satisfied than the initial grantors with the easement and their relationship with their easement holder. This may have implications for future investments in land management improvements because previous research demonstrates that landowner satisfaction is positively correlated with pro-environmental behaviors (Ramkissoon et al. 2012; Lopez-Mosquera and Sanchez 2011). Within the context of perpetual conservation easements, the number of major legal challenges and violations of easements have been increasing with the majority of those challenges involving landowners who did not convey the easement (Rissman and Butsic 2011). Some land trusts are developing strategies to deal with the financial costs of future legal challenges, such as the Land Trust Alliances' Terrafirma conservation easement defense insurance program (Land Trust Alliance 2009).

While this is an important step, conservation easement holding organizations also need to address the potential social consequences of increasing easement challenges. Increasing conflicts over easements could serve to undermine the viability of easement programs everywhere. While initial education and outreach between successive generation easement landowners and easement holders is important, maintaining relationships with all easement landowners will require persistent, sustained efforts (Rissman 2013). Easement holding organizations should develop staff capacity specifically focused on cultivating ongoing relationships between themselves and their landowner partners beyond the traditional role of easement monitoring and enforcement. As one respondent commented, "the conservation easement representative for my program has done a very poor job of building a relationship with me. Our (group) has occasional meetings where they (the easement holder) could join in and build relationships with our 'community'. They are missing an educational opportunity to encourage new and proven tools for us to use as a group."

Developing social capital-fostering programs that specifically target private landowners is one strategy that has been successful in other contexts. Easement holding organizations could use landowner-driven social capital models that have proven successful in promoting collaboration and land management in other contexts, such as is seen with wildlife management associations (WMA's) (Wagner et al. 2007) or prescribed burn associations (PBA's) (Twidwell et al. 2013; Toledo et al. 2012). These types of social capital models rely on peer to peer learning and cooperation rather than the more traditional one direction educational delivery model (Kueper et al. 2013). Many

NGO's, in particular, have both the experience and capacity to create or support collaborative landowner networks. Extensive research has shown the benefits of promoting landowner associations in enhancing ecological functions, promoting ongoing active management and fostering social bonding all of which potentially increase the ecological efficacy of conservation easements over the long term (Kueper et al. 2013; Wagner et al. 2007; Lai and Kreuter 2012; Toledo et al. 2012).

(3) Our research demonstrates a clear relationship between frequency of contact between landowners and easement holders and landowners' attitudes about their easements. In addition, while many landowners viewed the relationship with their easement holder to be positive, as one landowner stated, "the personnel and philosophy of the conservation holding organization are critical [to this relationship]". Strong relationships between easement holders and landowners are likely to increase the effectiveness of on the ground conservation on easement properties, whereas weak relationships may lead to a decline in the maintenance of conservation practices. Given these findings, easement holders should incorporate capacity needs into their easement program planning and carefully consider their ability to cultivate and sustain working relations with their landowner partners before accepting easements. Increasing access to technical guidance and funding opportunities provides an on-going tangible benefit to both grantor and successive generation landowners. However, this potential communication is not a one way street. Many landowners are effective educators and natural leaders who are capable of providing easement holder staff with local knowledge of natural resource and land use history as well as land management skills that may

enhance the success of conservation endeavors. Furthermore, happy easement landowners are more likely to encourage their neighbors to convey easements. Leveraging positive landowner-easement holder relationships with strong landowner networks may provide opportunities to increase collaborative management over larger geographic scales (Rissman and Sayre 2012). For example, one group of nine landowners in our study had all placed easements on their adjacent properties in order to protect a river segment. Previous research has highlighted the need for planning land conservation programs in a way that creates large, contiguous protected landscapes (Stoms et al. 2009). While this makes ecological sense, it also makes sense from the standpoint of managing landowner relations. Easement holders are more likely to develop and maintain social networks with their partner landowners and provide technical assistance necessary for effective land management within local, connected easement programs (Rissman and Sayre 2012). In areas where there are active, spatially focused easement programs, connecting existing easements with new easements is critical for achieving landscape scale successes.

Additionally, the role of women in easement programs should be explored further. Women tend to exhibit more pro-environmental behaviors than men (Dietz et al. 2002; Zelezny et al. 2000). Our research found that women were more satisfied with their easement and the relationships with their easement holders than men, a finding that suggests easement holders should tailor some of their outreach efforts specifically towards women.

(4) Whether or not the easement holding organization was a federal agency or not proved to be a strong predictor of landowner dissatisfaction with both their easement and their relationship with their easement holder. While federal agency easement holding organizations in Texas include both the U.S. Fish and Wildlife Service (USFWS) and the Natural Resources Conservation Service (NRCS), the preponderance of respondents included in this category (54 out of 59 respondents) had easements held by the NRCS. The NRCS is one of the top permanent easement holders in the United States, holding perpetual easements as part of the Wetland Reserve Program (WRP) and Grassland Reserve Program (GRP). Several landowners associated with a federal easement holder voiced frustration with bureaucratic hurdles required for making management decisions on their easement property. One common theme expressed in the comments section of the survey revolved around the lack of flexibility for conducting land management activities on easement lands. For example, on NRCS easements in Texas, landowners who wish to conduct any management activities on their easement property must submit a compatible use agreement each year, which is subject to approval by the state NRCS office. Two respondents' comments clearly demonstrate such sentiments:

"As with the government, there is way too much red tape. You have to get approval and permission for even the simplest of activities."

"The local (federal agency) guys are great to deal with and share common sense ideas on compatible management practices, but nothing can get through the (agency's local office) bureaucracy…"

Allowing more decentralized decision making to occur at the local level by permitting landowners to obtain approval for management activities through local NRCS biologists would allow management decisions to be made based on actual site conditions. Allowing local staff to approve management decisions would also facilitate a more timely decision making process that would be more responsive to changing local conditions. The frustration expressed in our study with federal governmental agencies suggests that more research is needed to explain the root causes and potential remedies for mitigating potential landowner conflicts over easements.

Conclusions

The use of conservation easements for mitigating threats to biodiversity is fast becoming a leading incentive-based land conservation tool. In conjunction with research demonstrating the ecological effectiveness of easement protections, theoretical research expanding on environmental attitudes concerning conservation easements is necessary for a comprehensive understanding of this protection mechanism. While easement conveyance may prevent some types of ecological damage, chiefly habitat fragmentation and infrastructure development, ongoing land management will be required to maintain conservation targets. Easement landowners will bear the bulk of this responsibility but easement holders have the opportunity and responsibility to influence management decisions on easement protected landscapes. However, if the underlying social relations between landowners and easement holders become confrontational rather than collaborative, it has the potential to undermine the value and effectiveness of conservation easements as a legitimate tool for conserving private lands.

Our study contributes to the body of knowledge on the efficacy of long-term conservation programs by highlighting social factors that may reinforce or undermine protections. Given the widespread application of perpetual conservation easements both in the U.S. and abroad and the cultural and ecological diversity represented in our study sample, the findings presented in this study provide a barometer of current landowner attitudes concerning perpetual conservation easements. Furthermore, many of the factors identified in this research as impacting landowner easement satisfaction and social relations between landowners and easement holders pertain to easement programs everywhere. Key insights from this study provide several important management implications including the need for: 1) increasing easement holder capacity to manage landowner relations and outreach, 2) comprehensive planning focused on creating contiguous easement programs, 3) incorporating adaptive management plan capabilities within easements and 4) connecting easement landowners with peer-to-peer social network natural resource management groups.

CHAPTER IV

FACTORS INFLUENCING LAND MANAGEMENT PRACTICES ON CONSERVATION EASEMENT PROTECTED LANDSCAPES

Overview

The goal of this research is to investigate factors that influence conservation-oriented land management practices on land holdings with conservation easements. I report the results of a mail survey that produced responses from 251 out of a total of 518 landowners with a permanent conservation easement on their property. I predicted that landowner satisfaction with their easement and good relationships between landowners and easement holders would be positively correlated with the amount of conservation-oriented land management practices. However, I found landownership motivations to be a stronger predictor of active land management. I also found significant management differences between landowners with different easement holders. The results of this study suggest the need for: increased easement holder capacity supporting targeted outreach with landowners; increased monitoring of ecological targets on easement properties; promotion of landowner participation in peer-to-peer management networks; and increased easement flexibility mechanisms by easement holders to better accommodate adaptive management.

Introduction

Perpetual conservation easements have become one of the most commonly used land protection tools in the United States (U.S.), and are increasingly being implemented in other countries where they are often referred to as conservation covenants (Iftekhar et

al. 2014; Pidot 2005; Fairfax et al. 2005; Pocewicz et al. 2011). A conservation easement is a contractually binding agreement, developed between a landowner and a third party that limits how property can be used, with the overarching goal of protecting conservation targets on the land from ecologically deleterious land uses (Merenlender et al. 2004). While most conservation easements share common restrictions, such as prohibitions on land subdivision and most infrastructural development, every easement is individually negotiated between the landowner and the easement holder and, therefore, the terms between easements can vary widely (Gustanski and Squires 2000). Generally conservation easements are, by design, a negative easement, meaning that they restrict certain activities but do not require landowners to perform specific management actions on their land. However, the utility of a conservation easement in providing ecosystem services to society may be enhanced if that land is managed in a way that improves the conservation targets the easement is intended to protect. Land management is one of the major driving factors influencing ecosystem function and, by extension, the provisioning of ecosystem services (Otieno et al. 2011; Furst et al. 2011). Furthermore, the absence of active land management can reduce landscape resilience, affect land cover and decrease ecosystem function (Allen et al. 2011). For example, the lack of application of periodic prescribed fire has led to increased thicketization and rangeland degradation throughout much of our study area in Texas (Twidwell et al. 2013). Ironically, in some cases, perpetual easements may hinder land management because the static nature of the prohibitions limits the decision-making flexibility often required for adaptive management within dynamic ecosystems (Richardson 2010; Rissman et al. 2013).

Sustaining ecosystem functions that easement programs are designed to protect requires on-going conservation land management. However, little research has examined conservation-oriented land management practices on conservation easement properties (Ernst and Wallace 2008; Rissman et al. 2013; Pocewicz et al. 2011). I define conservation land management as any human activity affecting land cover and designed to promote conservation values (Oudenhoven et al. 2012). Examples include but are not limited to vegetation manipulation through the use of prescribed fire or mechanical or chemical treatments, protection of riparian buffers, restoration of wildlife habitat, and wildlife population management.

A 2005 survey of 215 landowners from a single county in Colorado, all of whom had participated in private land conservation programs, included only a cursory measurement of management activities reported on protected properties (Ernst and Wallace 2008). In 2008, Pocewicz et al. (2011) evaluated the effectiveness of conservation easements in protecting sagebush habitat within the Wyoming Basins ecoregion of Wyoming. The researchers used spatial analysis to measure habitat parameters and a brief mail survey asking landowners with (n=14) and without (n=10) conservation easements if they had used various land management tools. The authors found that landowners with conservation easements were not significantly more likely to report using land management practices or seek out technical assistance for management than landowners without easements (Pocewicz et al. 2011). Rissman et al. (2013), examined mechanisms incorporated into conservation easement documents in Wisconsin. They found several different potential tools for facilitating land management

including the use of management plans, retained rights, amendment clauses and conditional use permits. However, the study concluded that the structure of many conservation easements placed significant restraints on landowners' ability to conduct adaptive management.

The goal of our research is to identify factors that are predictive of conservation land management practices on easement-protected landscapes. Based on previous research and the hypotheses presented below, I expect that patterns of land management on easement properties are influenced by social-ecological conditions mediated by easement constraints. Specifically, I am interested in how landowner satisfaction with their conservation easement, easement holder/landowner relations, grantor vs. successive generation landownership, landownership motivations, easement holder institutional differences and landowner residency on conservation easement lands affect management actions. In order to examine these issues, I propose six hypotheses:

H1. Landowner satisfaction with their easement – Landowners expressing more satisfaction with their conservation easement will be more likely to engage in conservation management practices (Ramkissoon et al. 2012; Kabii and Horwitz 2006). With few exceptions, each conservation easement prescribes a unique set of rules governing the land use restrictions and retained rights of the encumbered property. Some landowners may feel more constrained by their easement regulations than others. A perceived lack of autonomy may lead to dissatisfaction or frustration with restrictions prescribed in the conservation easement causing landowners to engage in less active management.

H2. Easement holder/landowner relationship - Landowners who have a positive relationship with their easement holder will be more likely to conduct pro-environmental land management practices on their easement properties than landowners who do not. Rissman and Sayre (2012) concluded that social networks created between easement landowners and easement holders promoted increased management on conservation easement protected lands, partially as a result of landowners' increased access to financial incentives and land management resources. Social exchange theory posits that when two entities have a strong, positive interdependent relationship, they are more willing to engage in a continuing reciprocity (Cropanzano and Mitchell 2005). In this case, reciprocity includes assistance, such as technical guidance, that encourages landowner engagement in management practices that achieve conservation goals.

H3. Grantor vs. successive landownership - Landowners who originally conveyed the conservation easement (i.e. grantor landowners) will be more engaged in pro-conservation land management actions than landowners who either bought or inherited land with a conservation easement already in place (successive landowners). The value-belief-norm theory of environmentalism (VBN) posits that personal moral norms are strong drivers of individual inclinations of pro-environmental behavior (Lopez-Mosquera and Sanchez 2012; Stern 2000). Given that grantor landowners have already exhibited pro-environmental behavior through the act of conveying the easement, I expect that they will continue to exhibit such behavior by managing the land to achieve conservation goals (Stern 2000). By contrast, successive generation landowners may be less invested in the protection ideals outlined by the easement and

therefore may be less likely to invest in management inputs designed to promote easement goals.

H4. Landownership motivations - I hypothesize landowners owning property for amenity purposes (e.g. recreation or hunting/fishing) will manage their property differently than owners primarily interested in production or land as an investment (Cross et al. 2011; Petrzelka et al. 2012; Haggerty and Travis 2006). Previous studies have shown landowner views about their property affect land use, management preferences, land cover and ultimately ecosystem processes (Abrams and Bliss 2012; Gosnell et al. 2006; Sorice et al. 2012). Because of this, I expect that management actions will closely track landownership motivations.

H5. Easement holder institutional differences - Increased decision making flexibility and fewer bureaucratic hurdles presented by easement holding entities will translate into increased pro-conservation management activity on easement properties. Flexibility in making easement management decisions is affected by easement holder polices and may vary widely between easement holding organizations (Rissman et al. 2013). Most easements owned by non-government organizations (NGOs) and local or state agencies are designed on a case-by-case basis where landowners negotiate their retained rights with the easement holder; management plans are often built into the easement instrument and variance requests to conduct management outside the contractual restrictions may be accommodated with few bureaucratic hurdles (Rissman et al. 2013; Rissman 2010). In contrast, most easement programs managed by federal agencies use standardized easement restriction guidelines.

H6. Landowner residency on easement land – Easement lands owned by full time property residents will be more actively managed than those owned by weekend residents or absentee landowners. Previous research has shown that weekend residents and absentee landowners are more likely to own land for amenity rather than production purposes, less likely to depend financially on their land, less likely to be engaged in land management and less likely to contact natural resource professionals (Abrams and Bliss 2012; Ma et al. 2012; Petrzelka et al. 2013).

Methods

The study population included all identifiable landowners in Texas whose property was protected by a perpetual conservation easement in 2011. Using information provided by the Texas Land Trust Council, an organization that tracks conservation easements throughout the state, I identified every known easement holding organization, private and public, operating in Texas (n=33). To develop the landowner contact database, I contacted all of these easement-holding institutions to request their assistance in identifying potential landowner participants. Ultimately, I identified 518 landholdings with permanent easements held by 33 organizations. Sixteen of these easement holding organizations directly provided contact information for 409 landowners. Another 16 organizations, holding 89 conservation easements, declined to provide landowner contact information. However, in Texas, conservation easements are attached to property deed records and available in county record offices. By searching these public records for the grantee names (i.e. the easement holder), I was able to obtain contact information for 69 of the 89 landowners associated with these organizations. Finally, one land trust,

representing 20 landowners, did not wish to provide member contact information but instead participated in the study by concomitantly sending survey items, provided by us, directly to its members.

The study was conducted using a multi-phase mail survey, which was administered using a Dillman's mail survey protocol (Dillman 2000), which was modified by substituting a second reminder post card for the third survey questionnaire in the fifth mailing. The survey was initiated in September 2011 and was terminated four months after the first mailing. The five mailings included: a pre-survey notification letter (day 1), the survey questionnaire and cover letter (day 7), a reminder/thank you postcard (day 14), a replacement questionnaire (day 28), and a final reminder/thank you postcard (day 42).

The survey questionnaire contained 78 questions addressing four primary areas of inquiry including: land management activities on conservation easement properties, easement-specific issues, property rights orientations, and landowner demographics. This paper reports on the section of the survey focused on land management conducted on conservation easement properties. Survey participants were also invited to provide written comments about their conservation easements at the end of the questionnaire, some of which are used for illustrative purposes in the discussion. In addition, to test for non-response bias, an abbreviated one-page questionnaire including six attitudinal and demographic indicator questions was sent in March 2012 to all landowners who did not respond to the survey.

Survey data were entered into Microsoft Excel and analyzed using STATA 12.0. (StataCorp 2011). Statistical analyses included: descriptive statistics for demographic data, t-tests and Chi-square (χ^2) for non-response bias analysis, and principle components analysis (PCA) was used to group related variables into functional indices. Logistic regression models were used to test our six hypotheses.

Development of Dependent Variables Used for Regression Analyses

Survey participants were asked about their use of 14 common land management practices. Each practice was coded as a binary variable indicating that the respondent had either used the practice or not. I used PCA to group related variables into indices. Cronbach's α was used to determine internal reliability for each subscale.

Development of Independent Variables Used for Regression Analyses

Independent variables used in the regression models included: reasons for landownership, whether or not the landowner was the original grantor of the conservation easement, landowner's level of satisfaction with the conservation easement, landowner's level of satisfaction with the relationship with the easement holder, category of easement holder (non-governmental, state/local agency or federal agency) and residency on the easement property (Table 10). Demographic control variables included landowner's age, years of education and length of easement property ownership. The size of the easement (in acres) was log transformed to normalize the distribution and the transformed data were used in the models in order to control for the effect of property size differences on management decisions.

Table 10. Independent variables used in regression models. The term conservation easement is abbreviated "CE".

Variable Labels	Variable Descriptions
Landownership Motivations	
Farmer/rancher	PCA index variable representing farming and/or ranching as primary reason for CE landownership
Hunting/fishing	PCA index variable representing hunting and fishing as primary reason for CE landownership
Investment	PCA index variable representing financial investment as primary reason for CE landownership
Lifestyle/recreation	PCA index variable representing non-consumptive recreation as primary reason for CE landownership
Grantor landowner	Landowner granted the easement. Binary single item variable; 1=yes, 0=no
Satisfaction	
CE Satisfaction[a]	PCA index variable representing landowner satisfaction with their CE
CE Relationship[a]	Ordinal response to survey question, "I have a good relationship with the organization that holds my conservation easement"
CE Owning Institutional Characteristics	
Federal government [b]	Easement holder is a federal government agency
State/Local government [b]	Easement holder is a state or local government agency in Texas
Landowner/Landholding Characteristics	
Weekend resident	Binary single item variable; full-time resident is reference category
Absentee landowner	Binary single item variable; full-time resident is reference category
CE Size	Size of CE in acres, data log transformed for normalization
Length of easement property ownership	Response to survey question, "How long has the conservation easement property been in your family? (years). Continuous single item variable
Age of landowner in 2011	Landowners age in 2011. Continuous single item variable
Years of education	Landowners number of years of education. Continuous single item variable

[a] Ordinal responses based on likert scale 1=strongly disagree, 2=disagree, 3=slightly disagree, 4=neutral, 5=slightly agree, 6=agree, 7=strongly agree

[b] NGO is reference category.

In order to reduce the number of explanatory variables in the regression models, some independent variables were developed as latent indices using principal components

analysis. The first, measuring landowner's reported satisfaction with their conservation easement (CE Satisfaction) was developed from a series of three questions: (1) If I had the opportunity, I would consider granting further conservation easements on additional land that I own; (2) I am happy to abide by the terms and conditions of the conservation easement on my land; and (3) Given the option, I would not terminate the conservation easement on my property. The resulting index variable (α=0.8287) was created from ordinal data that were derived using a 7-point response scale (1= strongly disagree, 4= neutral, 7= strongly agree) for each of the three questions.

In order to test the effects of landownership motivations on management, a second group of indices were developed using PCA from a set of 14 questions asking respondents about their reasons for owning their easement properties. Survey participants were asked to rank, according to a 7-point response scale (1=not at all important, 4=moderately important, 7=very important) how important each of the following reasons were for owning their conservation easement property: place to relax, enjoy the outdoors, manage wildlife, non-hunting or fishing recreation, financial investment, sell for profit someday, operate a farm or ranch, hay or forage production, mineral extraction, livestock production, earn a profit, crop cultivation, operate a hunting enterprise, recreational hunting or fishing.

The derived variables were used to create multinomial logistic regression models examining factors influencing land management on easement properties. Modeling results are reported using the p-value and the percentage change in odds, rather than the β coefficient, to provide a more intuitive model interpretation. To avoid the elimination

of marginal variables that could aid further research efforts statistical significance was determined at $p<.10$, rather than the more traditional value of $p<.05$.

Results

Of the 518 surveys sent to potential participants, 18 were returned due to incorrect addresses; therefore, the effective sample size was 500. Of these, 273 were returned; 251 were useable and 22 were either incomplete or from participants who indicated that they did not wish to participate in the survey. This translates into a 50% useable response rate (251 of 500) from the original sample. In addition, of the 227 non-responding landowners who were sent an abbreviated questionnaire, 47 (21%) completed and returned it.

Respondent Profiles

While 98% of respondents were Texas residents, I received completed questionnaires from five landowners residing in four additional states (Louisiana, Ohio, Colorado and Florida). Most of the survey respondents were male (83%), well educated (mean years of formal education = 16.4, *SD*=3.2) and were, on average, in their sixties (*M*= 62 years, *Range*= 35-88, *SD*=11.2), mirroring trends reported in other studies of conservation easement landowners (Ernst and Wallace 2008; Farmer, Knapp, et al. 2011). Additionally, 82% of the respondents were the original grantor of the conservation easement. Nearly half (45%) of respondents were absentee landowners of their easement properties, 36% lived on their property full time and 19% used their easement property as a weekend residence. The median size of easement property was 350 ac (*M*=1384 ac, *Range*=1.3-30,000 ac, *SD*=3407.6), and the mean length of

ownership within the family was 38 years (*Range*=1-165 years, *SD*=43.1). The majority of respondents (61%) did not generate any of their annual household income from their easement property, 34% reported earning 1-25% of their annual income from their CE land and only 5% relied on their easement property for more than 25% of their annual income.

Returned survey questionnaires included easements held by 26 of the 33 identified easement holding entities in Texas. The 7 easement holding entities not represented in our response sample were all small, holding 13 conservation easements in total (3% of our population sample) between them. Sixty-one percent of respondents' easements were held by an NGO, 23% by a federal agency and 16% by either a state or local government agency.

Using χ^2 and t-tests, I compared survey respondents (n=251) with those landowners who returned the abbreviated non-response survey (n=47). Of the six survey items used in the non-response survey, I did not find any statistically significant differences between the survey respondents and non-respondents for five of the six items (age, easement granting landowner, frequency of interaction between landowner and easement holder, residency on easement property, and willingness to comply with easement terms). However, when asked, "Given the option, I would terminate the conservation easement on my property", non-respondents were significantly ($p<0.001$) more likely to agree with that statement. This suggests that the non-respondents may, on average, have been less satisfied with their conservation easements.

Principal Components Analysis

The dependent variables used in our regression models were developed using principal components analysis. Results of the PCA analysis (Table 11) revealed four separate indices: wildlife, range, water and timber, which were named according to overarching management goals.

Table 11. Rotated factor loading results of PCA analysis of conservation easement land management practices with Cronbach's α measuring internal scale reliability.

Management practice	*Wildlife** α=0.7644	*Range** α=0.6802	*Water** α=0.6144	*Timber** α=0.7598
Census wildlife	**0.5912**	-0.0175	0.2916	0.0289
Supplemental food	**0.7102**	0.0585	0.3299	0.3299
Supplemental water	**0.6600**	0.0648	0.3597	-0.0896
Selective buck/doe harvest	**0.8352**	0.0418	-0.0523	-0.0523
Control feral hogs	**0.6185**	0.2234	-0.1516	-0.1516
Use prescribed fire for brush control	0.3174	**0.5721**	0.0512	0.0901
Mechanical brush control	0.2008	**0.5462**	0.2808	-0.0358
Chemical brush control	0.0692	**0.6485**	-0.0327	0.0590
Chemical invasive control (other than brush)	0.0064	**0.7371**	0.0291	0.1630
Reseed rangelands with native grasses/forbs	0.2481	**0.4955**	0.4110	0.0451
Use riparian buffers	0.0682	0.0350	**0.7279**	0.2345
Control soil erosion	0.2112	0.2379	**0.6825**	0.0561
Reforest for CO^2 sequestration	0.0496	0.1504	0.0829	**0.8548**
Restore forests with native tree species	0.0301	0.0135	0.0717	**0.8826**
Eigenvalue	4.28	1.98	1.60	1.17

* Shaded values indicate variables that load on a specific factor

Two of the indices had α scores less than 0.700; the "range" subscale (α=0.6802) was accepted for subsequent analysis but the "water" subscale α score (0.6144) was considered unacceptably low and the two associated components were analyzed separately. Social science norms generally prefer α scores above 0.700 (UCLA

Academic Technology Services 2004) but lower α scores are frequently viewed as adequate (Cortina 1993, Clark and Watson 1995).

In addition to the dependent variables, some of the independent variables used in the regression models, specifically those related to landownership motivations, were also derived using PCA. Analysis identified four index variables (Table 12), all of which had α scores >0.700.

Table 12. Results of PCA analysis of landownership motivations with Cronbach's α measuring internal scale reliability. Bolded results indicate variables that load on a particular factor.

Landownership motivations	Lifestyle/ recreation α=0.7058	Investment α=0.7866	Farming/ ranching α=0.8417	Hunting/ fishing α=0.7002	Overall mean response score[a]
Place to relax	**0.7985**	-0.0808	0.0134	0.0674	6.07
Enjoy the outdoors	**0.8574**	-0.1222	0.0831	0.0344	6.39
Manage wildlife	**0.6517**	0.1471	-0.1340	0.3232	5.76
Non-hunting/fishing recreation	**0.6425**	-0.0166	-0.1762	-0.0982	4.82
Financial investment	0.0066	**0.8120**	0.1605	0.2195	4.12
Sell for profit someday	-0.1223	**0.8376**	-0.0641	0.1855	3.15
Operate farm/ranch	0.0380	0.0905	**0.8546**	0.2226	4.00
Hay/forage production	-0.0184	0.0782	**0.8544**	-0.0226	2.95
Mineral extraction	-0.0138	0.3880	**0.4762**	-0.0818	2.03
Livestock production	-0.0315	-0.0771	**0.8384**	0.2690	3.42
Earn a profit	-0.2836	0.4636	**0.5533**	0.2676	3.45
Crop cultivation	0.1172	0.4476	**0.5195**	-0.1993	2.16
Operate hunting enterprise	-0.0195	0.2359	0.2356	**0.7996**	3.10
Hunting/fishing (recreational)	0.2618	0.1997	0.1968	**0.7390**	4.71
Eigenvalue	2.48	1.68	4.07	1.00	

[a] Mean response scores based on likert scale 1=not at all important, 2=unimportant, 3=somewhat unimportant, 4=moderately important, 5=somewhat important, 6=important, 7=very important.

Regression Models

The results of five regression models are presented in Table 13. These models explore how the variation in responses for the land management variables can be explained by 12 independent variables as predicted by our six hypotheses.

The first two hypotheses predicted that landowners expressing more satisfaction with their easement [*H1*] and the relationship with their easement holder [*H2*] would be more likely to conduct management on easement properties. The study produced only limited evidence to support those predictions. Satisfied landowners were 68% more likely to conduct range management practices on easement properties than dissatisfied landowners. In addition, landowners who were satisfied with their easement holders were 28% more likely to implement management practices that reduce soil erosion than landowners whose relationship with the easement holder was less satisfactory. However, the study did not produce any additional corroboration that landowner satisfaction with their easement and with their easement holder influenced the degree to which they applied conservation-oriented land management.

Table 13. Logistic regression models of factors influencing management practices on easement properties. Bolded results indicate significance at p<0.10.

	Range Mgmt		*Wildlife Mgmt*		*Riparian Mgmt*		*Timber Mgmt*		*Soil Mgmt*	
	*model P<0.031**		*model P<0.000**		*model P<0.011**		*model P<0.000**		*model P<0.0060**	
Independent Variables	p-value	% Δ in odds	p-value	% Δ in odds	p-value	% Δ in odds	p-value	% Δ in odds	p-value	% Δ in odds
[H1] *CE Satisfaction*	**0.005**	**68.0**	0.116	-25.5	0.823	-5.9	0.792	4.7	0.289	27.1
[H2] *CE Relationship*	0.417	-8.5	0.619	-5.3	0.266	20.0	0.236	-12.7	**0.091**	**28.1**
[H3] *Grantor landowner*	0.546	-21.6	0.126	86.7	0.243	113.5	**0.032**	**145.5**	0.563	-26.9
[H4] *Ownership motive*										
Farming/ranching	**0.100**	**28.9**	0.249	-15.7	**0.057**	**-36.4**	**0.001**	**-38.8**	0.569	11.8
Hunting/fishing	0.432	5.9	**0.002**	**25.4**	0.456	-7.4	0.428	-5.7	0.380	-7.8
Investment	**0.062**	**-24.3**	0.869	2.4	0.163	36.2	**0.000**	**74.7**	0.627	9.5
Lifestyle/recreation	0.892	-2.0	0.447	12.9	0.470	17.6	0.969	-0.5	0.777	5.4
[H5] *Easement holder*										
Federal gov't holder [a]	0.308	-30.5	**0.006**	**-62.7**	0.274	74.2	**0.000**	**660.7**	0.566	29.7
State/local gov't holder [a]	0.888	-5.2	0.190	66.5	0.183	112.1	**0.048**	**-55.5**	0.224	95.3
[H6] *Landowner residency*										
Weekend resident [b]	0.443	39.0	0.243	65.2	**0.086**	**169.8**	0.324	-34.6	0.554	-28.3
Absentee landowner [b]	0.855	6.4	0.947	-2.2	0.532	-26.9	0.718	13.5	**0.001**	**-76.8**
Control variables										
Size of easement (acres)	0.856	-1.6	**0.000**	**60.9**	0.657	6.1	0.127	-12.7	**0.026**	**30.4**
Years of education	0.556	2.9	0.830	-1.0	**0.027**	**18.5**	0.447	-3.5	**0.017**	**15.7**
Respondent age	**0.067**	**-2.4**	0.574	-0.8	**0.086**	**-3.2**	0.829	0.3	**0.007**	**-4.8**
Length of easement property ownership	0.950	0.0	0.590	-0.4	0.542	0.6	0.794	0.2	**0.057**	**-1.7**

[*] Model significance measured using prob > χ^2 results reported in model output

[a] NGO is reference category

[b] Full time resident is reference category

Similarly, the study did not provide widespread support for the hypothesis that grantor landowners were more likely to engage in land management than successive generation owners [*H3*]. The results indicate that grantor landowners were 145% more likely to conduct some timber management on easement lands than successive landowners, but there were no statistical differences with respect to the four other categories of conservation-oriented management actions.

The study provided evidence that ownership motivation does influence the level of engagement in various conservation-oriented land management actions [*H4*]. *Landowners motivated primarily by production* (i.e. farming and ranching) were 29% more likely to conduct range management activities, 36% less likely to manage riparian areas using buffers and 39% less likely to be involved in timber management than those with other primary motivations for owning their land. As expected, *landowners motivated by wildlife-related recreation activities* were 25% more likely to conduct wildlife management practices on their property, but were not more likely to conduct other types of land management actions that may also benefit wildlife. In contrast, *landowners owning their easement land primarily as an investment* were 24% less likely to engage actively in rangeland management practices but they were 75% more likely to actively manage their timber resources. While overall, *recreational landowners* represented a large proportion of our study sample, the study found no evidence that this group of landowners participates in land management more than any of the other groups.

The study also produced results supporting our contention that institutional differences between easement holders affects land management actions [*H5*]. Compared

to NGO held easements, landowners with federally held easements were 63% less likely to conduct wildlife management but much (661%) more likely to engage in timber management. In addition, landowners with easements held by state or local agencies were 56% less likely to manage for timber than those whose easements were held by NGOs.

The study produced mixed results with respect to our final hypothesis that full time residents would engage in increased management practices on easement lands [*H6*]. Absentee landowners were 77% less likely to manage for soil erosion and weekend residents were 169% more likely to use riparian buffers to protect water resources than full time resident landowners.

The control variables incorporated in the regression models were, in some cases, associated with statistically significant patterns. The size of easement properties was found to be positively associated with soil erosion control actions and management for wildlife. In addition, the number of years of formal education was positively associated with level of engagement in practices aimed at protecting both riparian and soil resources. Statistically, age of survey respondents was negatively correlated with active management for riparian and soil resources but the trend was small. Similarly, while length of easement property ownership was negatively associated with management for soil erosion, the effect was negligible.

Discussion

The results of this study suggest a more nuanced answer than our original hypotheses predicted. Specifically, there are many different reasons why landowners

choose to conduct conservation minded management on their properties. While the study did find instances where social relationships between landowners and easement holders appear to influence management activities of landowners, motivations for owning land and institutional effects of easement holders appear to have a greater influence on conservation-oriented land management behavior.

In explaining the seemingly negligible effects of landowner/easement holder relations, lack of capacity in easement holding institutions may be preventing formation of strong social networks as demonstrated in the Rissman & Sayre (2012) case study. In areas where landowners and conservation easement organization staff work closely together, it is possible that those relationships may drive increased management on protected properties. Most easement holding organizations in Texas have staff that oversees compliance monitoring of easement terms as a part of their overall duties but few have staff dedicated to providing outreach to their conservation easement landowner partners. Easement holding institutions, particularly those with a large easement portfolio, should dedicate staff specifically focused on easement landowner outreach that promotes increased conservation management practices on protected properties. In return for providing technical guidance, easement holders could implement appropriate ecological monitoring of conservation targets on easement-protected properties. Many current easements do not make provisions for ecological monitoring and even those that do include monitoring of biological targets in the easement provisions rarely conduct it (Rissman et al. 2013). Other studies have demonstrated that many easement programs find it difficult to measure the success of their efforts beyond the number of acres

protected and dollars raised and spent on the acquisition of easements (Alexander and Hess 2012). This so-called "bucks and acres" measurement does not provide any quantitative, scientifically-based information to the public about the overall effectiveness of conservation easements in protecting ecosystems. Including the right for easement holders to monitor conservation targets is necessary for designing effective, adaptive easement management plans and for measuring the success of the implementation of these plans and should be a priority for easement drafters in the future. Not only will ecological monitoring improve management but demonstration of actual conservation accomplishments, such as improved ground cover, water quality or increased populations of endangered species, will provide a stronger justification for continued support from funders and policy makers for easement programs (Rissman et al. 2007; Wallace et al. 2008).

This study found differences in management between properties with different easement holding organizations. In part, this might be explained by differences in the goals of these organizations. For example, the greater engagement in timber management reported on properties with federally owned easements is likely the product of agency programmatic goals. While federal agency easement holding organizations in Texas included the U.S. Fish and Wildlife Service (USFWS) and the NRCS, 54 out of 59 of the respondents included in this category were held by the NRCS. Most of these are enrolled in the WRP program, which includes a restoration component, often including reforestation, in the initial phase of the easement; this likely explains the higher level of timber management on these properties. Conversely, the comparative

decrease in timber management on state and local agency held easements might be due to the fact that many of these easements are located in the central part of the state, where woodland savannas are the predominant land cover and, therefore, many of the timber management practices measured in this study are not relevant. Inflexibility on the part of government agency easement holders may also be suppressing or preventing management actions on some easement properties, as evidenced by the decreased wildlife management reported on federally held easements (Rissman et al. 2013). However, easement holding organizations could encourage enhanced management by incorporating mechanisms in the easement instrument that allow for more adaptive management strategies (Miller et al. 2010; Rissman et al. 2013; Rissman 2010). Several landowners expressed frustration concerning the lack of adaptive management accommodation within the framework of their easement restrictions. As one landowner commented:

> *"Most conservation easements I have seen and mine are not flexible enough to adapt as new best practices emerge and as we learn more about the specific property. For example, [the survey] lists some land management practices I would probably use that are not allowed by my easement"*

The results of the study reinforces previous research that has found landownership motivation to be a significant factor driving management, even on landscapes that are already protected (Kreuter et al. 2008; Gosnell et al. 2006; Sorice et al. 2012). I found that production, investment, and consumptive recreation-oriented (i.e. hunting/fishing) landowners were all likely to manage their land in ways that enhance

their goals. In contrast, amenity landowners (those who own their properties primarily for non-consumptive recreation) represented a large proportion of our respondents but were not more likely than landowners in the other ownership motivation groups to implement management practices that would benefit the conservation values of their land. Other studies have found that recreational landowners who are not dependent on their land for income are less likely to conduct environmental management (Lai and Lyons 2011). I suspect that many amenity-oriented landowners may be unsure how to implement land management practices that benefit recreationally valuable conservation targets. Amenity-oriented landowners will probably continue to be the landowner group that is most likely to grant easements (Brenner et al. 2013). However, future landownership transfers will include changes in ownership motivations, some of which, may hinder land management actions necessary to support the original purposes of easement (Mendham and Curtis 2010). Easement holders developing outreach programs designed to encourage management on conservation easement lands should consider the variety of landownership motivations and provide targeted information to different landowner cohorts.

To enhance conservation-oriented management on easement lands, easement holders should also work closely with landowner-driven peer-to-peer learning networks and cooperative management groups. Such social networks have been shown to increase knowledge of and management for conservation outcomes in a variety of contexts and are easily tailored for differing landownership motivations (Kueper et al. 2013; Toledo et al. 2012; Wagner et al. 2007; Twidwell et al. 2013). This type of bottom up learning

approach has also been shown to foster trust between participants, encourage a sense of self-empowerment and motivate landowners to engage in increased management (Kueper et al. 2013). Finally, outreach programs need to consider landowners residency on their easement properties. While the community-based, social capital models may work well with resident landowners who maintain strong local ties, they are generally less accessible to absentee landowners. Previous research indicates that both non-residents and weekend residents respond well to direct mail outreach, particularly if it is followed up with a one-on-one consultation with a natural resource professional (Petrzelka et al. 2009).

While I feel that this study provides important preliminary evidence relating to natural resource management on conservation easement protected lands, there are several limitations that should be addressed in future research. First, while the study area encompassed a large state that is both ecologically and culturally diverse, it is possible that management trends observed here may differ considerably in other areas. Second, while our survey questionnaire asked landowners whether or not they have a good relationship and how often they interacted with their easement holder, our data do not provide an in-depth understanding of the exact nature of landowner easement holder relationships. In other words, a landowner may express having a good relationship with their easement holder despite having little to no interaction with them. Conversely, a landowner may report frequent interaction between themselves and their easement holders but that interaction may not be positive. In addition, analysis of our non-respondent survey indicated that landowners' level of dissatisfaction with their

conservation easement may be under-reported in our sample; a result I feel is mitigated by the high overall response rate (50%). Our study design also did not provide a mechanism for capturing landowners who intentionally choose to allow plant community succession on their land without active management interventions. Finally, our methodology for measuring land management relied on the use of dichotomous response variables, which limited our ability to measure the frequency of reported management activities. Future studies should consider capturing both a broader range of management practices and a more robust temporal analysis of management. Despite the limitations of this study, understanding how protected landscapes are managed and encouraging management actions that support both the ecological functions and recreational values on easement properties are paramount to ensuring that conservation easements are effective as a long-term conservation mechanism.

Conclusion

In conclusion, if perpetual conservation easement programs are to be successful tools for landscape protection, both landowners and easement holders need to consider and provide for consistent, active, adaptive management that protects and enhances the integrity, function and resilience of the ecosystem. Preservation is not enough to sustain ecosystem services provided by protected open spaces. Easement holders should carefully consider appropriate flexibility mechanisms that facilitate adaptive management actions in response to changing environmental and social conditions. In addition, conducting ecological monitoring on easement properties is necessary to determine the efficacy of an easement with respect to its stated objectives and to guide

adaptive management decisions. Finally, developing strategies promoting greater management cooperation between landowners and their easement holding partners is critical for sustaining the ecological benefits of easement protection over the long term. To achieve this, landownership motivations of both the easement grantors and successive generations owning easement-encumbered properties need to be addressed in order to ensure that landowners are encouraged to manage their land in ways that are consistent with the stated purpose of the easement. Increasing reliance on conservation easements as a primary land protection tool necessitates the ability to accurately assess the efficacy of easements from social, economic and biological perspectives. Particularly as the easement protection model is being implemented internationally, refining this tool so that it meets both the needs of society and the private landowners living with the restrictions is paramount.

CHAPTER V

LANDOWNER SATISFACTION WITH THE WETLAND RESERVE PROGRAM IN TEXAS: A MIXED METHODS ANALYSIS

Overview

Using mail survey data and telephone interviews, I report on landowner satisfaction with permanent easements held by the Natural Resources Conservation Service (NRCS) throughout Texas. Recent research found that landowners were dissatisfied with the NRCS Wetland Reserve Program (WRP), conflicting with results of previous studies. The objective of this study was to explore specific reasons for frustration expressed by landowners with the program. I found three predominant themes underpinning program dissatisfaction: 1) upfront restoration failures, 2) overly restrictive easement constraints and 3) bureaucratic hurdles limiting landowners' ability to conduct adaptive management on their easement property. The implications of this study suggest that attitudes of landowners participating in the WRP may limit the long-term effectiveness of this program. Landowner-driven suggestions for improving the program include: implementing timely, ecologically sound restoration procedures and streamlining and simplifying the approval process for management activity requests. In addition, the NRCS should revise WRP restriction guidelines in order to provide more balance between protection goals and landowner autonomy.

Introduction

Perpetual conservation easement programs are being increasingly used, in both the public and private sectors, as a mechanism for promoting conservation on private lands. By 2010, there were an estimated 8.8 Million acres of land in the U.S. protected by land trust held conservation easements and an estimated 12 million acres of conservation easements owned by public agencies (Chang 2011; Pidot 2005). While the use and application of conservation easements has been widely studied from the legal perspective (Byers and Ponte 2005; Cheever 1996; Gustanski and Squires 2000; Levin 2010; Lindstrom 2008; McLaughlin 2005), the ecological and social ramifications of conservation easements have not been thoroughly evaluated (McDonald et al. 2007; Merenlender et al. 2004; Pidot 2005). Recent research has begun examining ecological outcomes on conservation easement-protected landscapes (McDonald et al. 2007; Byrd et al. 2009; Noone et al. 2012; Pocewicz et al. 2011; Rissman et al. 2007; Wallace et al. 2008) but less is known about the social consequences of conveying conservation easements. Research into motivational drivers of easement conveyance identified pro-environmental attitudes as the primary incentive cited by landowners partnered with non-profit land trusts (Farmer, Knapp, et al. 2011) and economic inducements driving agricultural easement conveyance (Rilla 2002). However, in order to understand the effectiveness of easements, it is crucial to ascertain the long-term sociological ramifications of implementing such protection mechanisms.

Research on landowners owning conservation easement protected properties found that, while most landowners were satisfied with their conservation easement, there

were two groups of landowners who were generally unhappy with them (Stroman and Kreuter 2014). The first group consisted of successive generation landowners, that is those who did not convey the easement on their land but acquired the property either through inheritance or purchase. The second group consisted of those landowners whose easement was held by a federal government agency; specifically landowners whose easement was held by the Natural Resources Conservation Service (NRCS) as part of the Wetland Reserve Program (WRP). This finding contrasts with those of Forshay et al. (2005), who surveyed 69 WRP landowners in a four-county area of Wisconsin and reported that landowners participating in the WRP were generally pleased with the easement program. However, the authors reported on four areas of concern: restrictions against permanent deer hunting stands, increased tax rates on WRP sites, limited communication with NRCS agency staff and lack of opportunity for landowner participation in the restoration process. Similarly, a 2013 report of landowners participating in the NRCS Farm and Ranchlands Protection Program (FRPP), found that 96% of landowners reported being either satisfied or very satisfied with their conservation easement (Esseks and Schilling 2013).

The Wetland Reserve Program is a federal easement program primarily designed to provide financial incentives to private landowners for retiring marginal agricultural land and converting that land into wildlife habitat. The stated goal of the WRP program is to, "provide habitat for fish and wildlife, including threatened and endangered species, improve water quality by filtering sediments and chemicals, reduce flooding, recharge groundwater, protect biological diversity and provide opportunities for education,

scientific and limited recreational activities" (NRCS 2014). The WRP program is unique in that wetland creation or restoration is an essential component of every easement enrolled in the program. Most other easement programs serve to protect natural resources already in place and do not require any upfront restoration. WRP projects are not designed to protect existing, healthy wetlands. Rather, the purpose of the program is to create, expand and restore sites suitable for wetlands such as frequently flooded agricultural fields. The WRP was initiated in 1992 as part of the 1990 Farm Bill (NRCS 2013). By 2007, almost 2 billion dollars had been spent enrolling 1.9 million acres in the program. Of that total, 89.8% of the funding ($1.94 billion) and 77.6% of the total acreage (1.49 million acres) enrolled had been for securing permanent conservation easements (NRCS 2009). Since then, the total acreage enrolled in the WRP program has topped 2.6 million acres with WRP projects located in all 50 U.S. states (NRCS 2013). In 2014, the WRP was combined with the Grassland Reserve Program (GRP) and the Farm and Ranchlands Protection Program (FRPP) into what is collectively called the Agricultural Conservation Easement Program (ACEP). However, aside from the new name, the WRP (now called Wetland Reserve Easements) will continue to be managed according to the same rules and guidelines as before (C. Ross, NRCS, personal communication, February 2014). Most conservation easements are individually negotiated between grantor landowners and their easement-holding partner organization allowing for a wide variety of restriction and management configurations. In theory, this individually tailored approach allows landowners more latitude to incorporate adaptive management practices into their day to day operations; however, the WRP uses the same

restrictions for every easement it accepts (Rissman et al. 2013). This program dictates particularly restrictive easement covenants only permitting landowners the right to: (1) control access to the property, (2) maintain and convey title, (3) quiet enjoyment, (4) undeveloped recreational uses, (5) subsurface mineral resources, and (6) water rights (NRCS 2013). As explained by one NRCS staff member, "When we acquire a WRP easement, the federal government is basically almost acquiring all the bundle of [property] rights" (Rissman et al. 2013). Landowners wanting to conduct any management activities such as prescribed burning, rotational grazing, mowing or road maintenance on WRP properties must submit a formal request, called a compatible use agreement each year before any activity is permitted.

The purpose of this paper is to identify specific reasons for landowner discontent with WRP easements and provide recommendations for programmatic changes that address those issues. In order to better understand the root causes of this reported dissatisfaction, I relied on two sources of data: a state-wide mail survey and in-depth telephone interviews. This paper reports on the results of a 2011 mail survey asking landowners in Texas about their conservation easement and the relationship with their easement holder. Additionally, a subset of survey respondents participated in follow-up telephone interviews designed to better understand potential institutional (i.e. NRCS) causes of expressed landowner dissatisfaction with the WRP easement program. The mail survey, outlined below, identified landowners with federally held easements as being significantly less satisfied with both their conservation easement and the relationship with their easement holder (Stroman and Kreuter 2014). The mail survey

results were used to inform the design and implementation of the second part of this study, the telephone interview component. Using more than one analytical method allowed integration of the quantitative data generated by the mail survey with qualitative information from the interviews, providing a more comprehensive understanding of landowner experiences and attitudes regarding their easement program (Farmer, Chancellor, et al. 2011; Johnson and Onwuegbuzie 2004).

Methods

Mail Survey

The overall study population used for the mail survey included all identifiable landowners in Texas whose property was protected by a perpetual conservation easement in 2010. To identify all of the conservation easements in Texas, the Texas Land Trust Council, a statewide non-profit organization that maintains a conservation easement-tracking database was consulted. They provided a list of easement holding organizations, both private (e.g. land trusts) and public (federal, state and local government agencies), that were known to own perpetual conservation easements in Texas. Through this consultation, 33 different organizations holding conservation easements in Texas were identified. Each of these easement holding entities were asked, via letter, to provide landowner contact information for the mail survey database. Sixteen of these conservation easement holders directly provided contact information for 429 landowners. Another 16 organizations, collectively owning approximately 89 easements, declined to provide their landowner contact information. However, the contact information for 69 of the 89 landowners was obtained using public county deed

records. Finally, one organization, representing 20 landowners, did not provide member contact information but instead participated in the study by concurrently sending the survey items directly to its partner landowners.

The survey was initiated in September 2011 and was terminated four months after the first mailing. The survey questionnaire contained 78 questions addressing four primary areas of inquiry including: land management activities on easement properties, easement-specific issues, property rights orientations, and landowner demographics. Survey participants were also invited to submit comments at the end of the questionnaire, some of which are used for discussion purposes. The survey was administered using a five-phase modified Dillman's survey protocol (Dillman 2000), which included: a pre-survey notification letter (day 1), the survey questionnaire with a cover letter (day 7), a reminder/thank you postcard (day 14), a replacement questionnaire with cover letter (day 28), and a final reminder/thank you postcard (day 42) in place of a second replacement questionnaire recommended by Dillman. To test for non-response bias a one page abbreviated questionnaire including eight attitudinal and demographic indicator questions was sent in March 2012 to all survey non-respondents (n=227). Survey data were entered into Microsoft Excel and analyzed using STATA 12.0. (StataCorp 2011).

Telephone Interviews

In the mail survey, participants were asked whether they were willing to participate in a follow-up telephone interview. From this sub-sample (n=203), I isolated landowners who had easements held by either the NRCS as part of the WRP program

(n=41) or by The Nature Conservancy (TNC) (n=26). I used TNC held easements as a comparison population for several reasons. First, it is the largest non-governmental easement holding organization in our study area. Second, TNC held a comparable number of easements (n=88) within our study area as the NRCS (n=126). A randomized contact list was created from the group of survey participants who indicated their willingness to participate in a follow-up interview. Initially, the goal was to interview 20 landowners from each of the NRCS-WRP and TNC groups. Landowners who could not be contacted or declined to be interviewed once contacted were replaced with the next available participant. During the interview process I interviewed 20 landowners partnered with the NRCS but was only able to recruit 14 landowners with TNC easements. Interview questions were designed to examine issues uncovered during the mail survey analysis. The interviews were conducted by telephone, they were semi-structured, they ranged in duration from 10 minutes to 55 minutes, and they were recorded. Interviews were conducted over a 12 month period between May 2013 and May 2014. To build generalizations from the qualitative interview data, interview recordings and notes were analyzed and coded for topics and emergent themes. Specifically, responses were coded for references to: land management practices, program satisfaction or dissatisfaction, easement restrictions, partner organization relationship and restoration implementation.

Results

Mail Survey Results

Of the initial 518 mail survey participants, I received 18 returned questionnaires due to incorrect addresses resulting in an effective survey sample size was 500. Over half of the survey participants (273) returned questionnaires, 251 of which were completed and 22 were either incomplete or indicating respondents did not wish to participate. This translates into a 50% useable response rate. Of the 227 abridged questionnaires sent to the non-respondents, 47 completed questionnaires were received, representing 21% of the non-response pool and 9% of the total survey sample. Analysis of the abbreviated non-respondents survey did not find any statistically significant differences between survey participants and non-participants for five of the six measured indicators (age, whether the landowner had granted the easement, frequency of interaction between landowner and easement holder, residency on easement property and willingness to abide by the terms of the easement). Non-respondents were significantly more likely to express a desire to terminate their conservation easement.

The survey responses included easements held by 26 of the 33 easement-holding organizations in Texas. The seven conservation easement holders not represented in our survey responses were all small organizations that collectively held only about 13 conservation easements. Of the easements on properties of the survey respondents, 61% (n=152) were held by NGOs, 23% (n=59) by federal agencies and 16% (n=40) by state or local agencies. Of the 59 respondents having an easement held by a federal agency, 45 were WRP easements and 11 were Grassland Reserve Program (GRP) easements held

by the NRCS, and the remaining 3 were easements held by the U.S. Fish and Wildlife Service. Overall I received responses from landowners owning conservation easements in 87 different counties; respondents with WRP easements were confined to 17 counties located throughout the eastern half of the state (Figure 4).

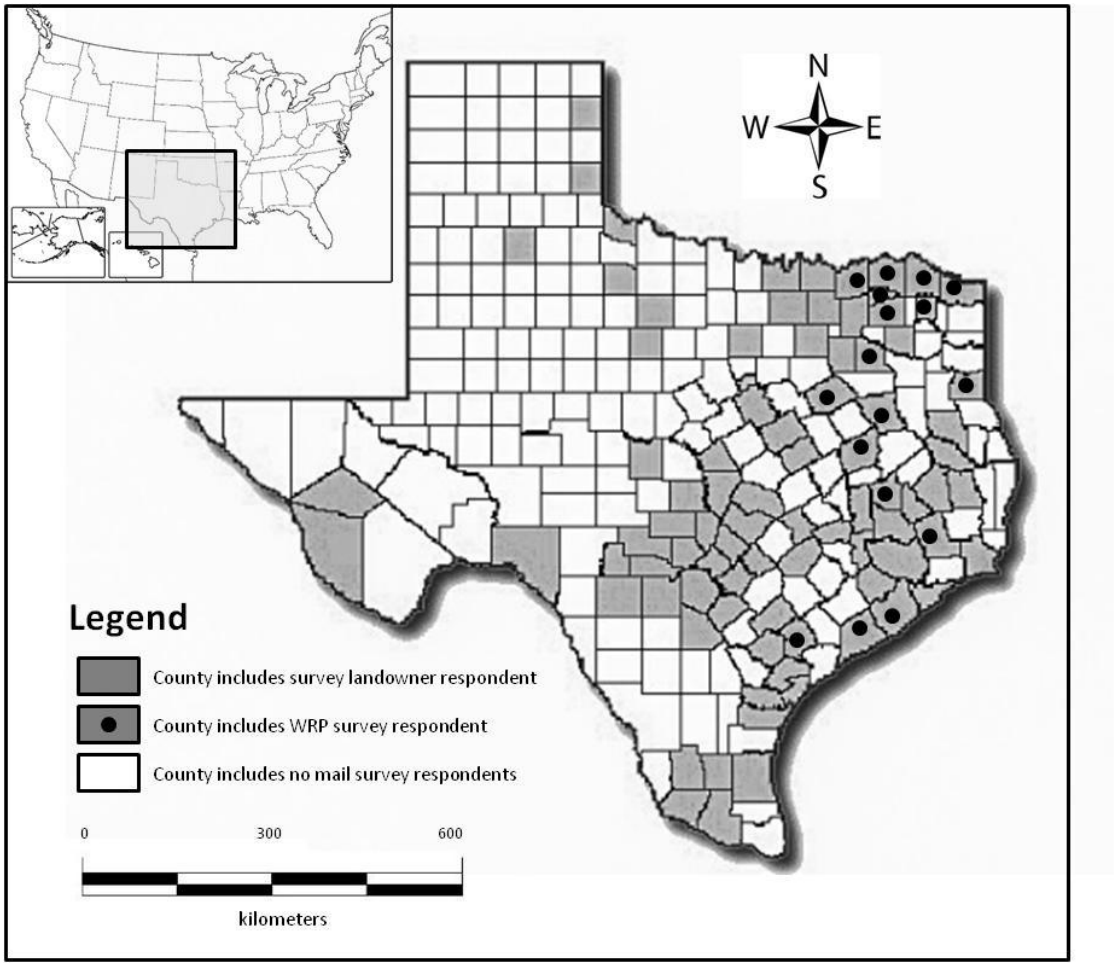

Figure 4. Mail survey respondents' conservation easement location by county.

Overall, the survey respondents were predominantly male (83%) with an average age of 62 years (*SD*= 11.19, *range*= 35 to 88 years), and an average of 16.4 years of formal education (*SD*= 3.16, *range*= 5 to 27 years). Of the respondents, 82% were the grantors of the easement, 36% resided full-time on their conservation easement property, 19% were weekend residents and 45% were absentee landowners. In combination, the survey respondents reported owning 328,148 acres under conservation easements. The size of easement properties ranged from 5 to 30,000 acres, with a median of 350 acres (*M*=1384 ac, *SD*=3407.6). The period of conservation easement property ownership also ranged widely from one to 165 years (*median*= 12 years, *M*=38 years, *SD*=43.1), with 38 respondents (15%) reporting that the property had been in their family for 100 years or more. Overall, 61% of respondents reported earning no income from their easement-encumbered property, 34% reported earning up to 25% of their income from it, and only 5% reported earning more than 25% of their income from it indicating that, in general, landowners with easement-encumbered properties do not rely substantially on that property to generate income.

Key demographical attributes of WRP and other conservation easement landowners were compared. As demonstrated in Table 14, WRP landowners were not significantly different from other conservation easement landowners, with one exception. Landowners having a WRP easement were more likely to rely on their easement property for a portion of their annual income with 58% of them having reported they receive some income from their easement property compared with just 33% of other easement landowners.

Table 14. Demographical differences between WRP and non-WRP conservation easement landowners.

Demographic variable	WRP Easement Landowners (n=45)	Other Easement Landowners (n=192)	Significance test
Gender			χ^2 p<0.275
Male	88.6	81.8	
Female	11.4	18.2	
Age	M=62	M=62	t-test p<0.9204
Live on property			χ^2 p<0.985
Yes	36%	36%	
No	64%	64%	
Length of property ownership			χ^2 p<0.754
Less than 3 years	5%	7%	
3-10 years	42%	34%	
11-25 years	30%	36%	
25+ years	23%	23%	
Annual income from CE property			**χ^2 p<0.003**
0%	42%	66%	
1-25%	53%	28%	
>26%	5%	5%	

Level of satisfaction with conservation easements was compared between WRP landowners and other easement holders by analyzing responses to four survey questions (Figure 5). The questions were as follows: 1. I have a good relationship with the organization that holds my conservation easement; 2. I am happy to abide by the terms and conditions of the conservation easement on my land; 3. If I had the opportunity, I would consider granting further conservation easements on additional land that I own; and 4. Given the option, I would terminate the conservation easement on my property.

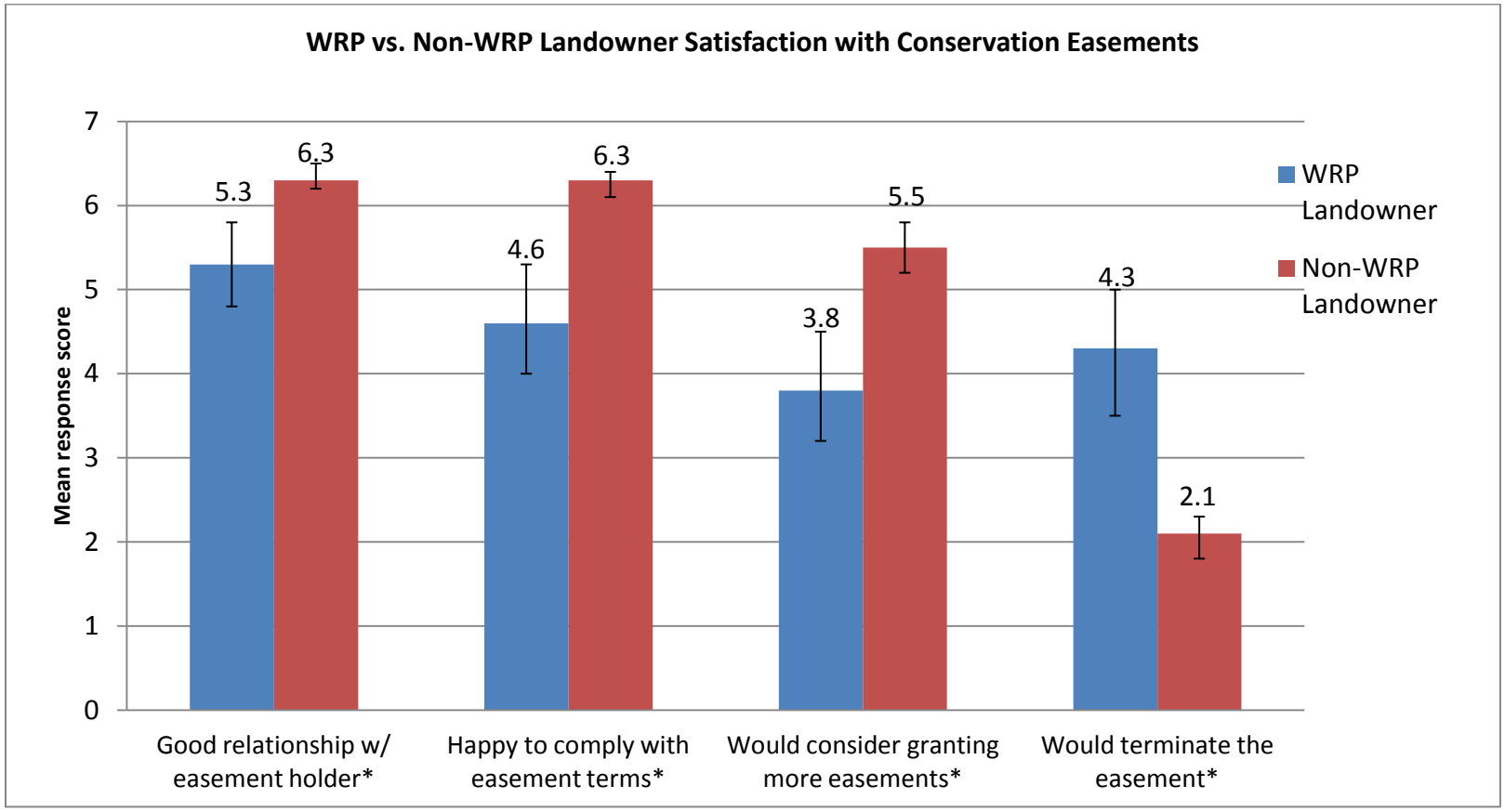

Figure 5. Landowner/easement holder relations and conservation easement satisfaction. Mean response scores based on Likert scale: 1=strongly disagree, 4=neutral, 7= strongly agree. * t-test significant at $p<0.05$. Error bars represent 95% CI.

These results indicate that landowners with a WRP easement are significantly less likely to report having a good relationship with their easement holder. While 77% of WRP landowners (vs. 93% on non-WRP landowners) acknowledged having a good relationship with the NRCS, only 24% of them strongly agreed with that statement. Similarly, while 66% of WRP landowners agreed with the statement, "I am happy to abide by the terms and conditions of the conservation easement on my land", only 11% indicated strong agreement. In contrast a full 92% of landowners with a different type of conservation easement agreed with that same statement. WRP landowners are also less likely to consider granting additional easements (40% of WRP landowners agreed vs. 71% of non-WRP landowners), Moreover, they are also much more likely to express a desire to terminate their easement, then landowners with easements held by other organizations; 44% of WRP landowners agreed with this sentiment and of those 35% agreed strongly with the statement. Conversely, only 10% on non-WRP landowners agreed that they wished to terminate their easement (4% strongly agreed).

Interview Results

While most participants were the original grantor of the easement, 35% of NRCS-affiliated interviewees (7 of 20) were successive generation landowners (i.e. they either purchased or inherited the easement property) and only 14% of TNC-affiliated interviewees (2 of 14) were not the original grantors of their easement. Another notable difference between the NRCS and TNC interviewees was that all of the NRCS landowners had sold their easement to the NRCS while almost every TNC interview participant (86%) indicated that their easement was donated to the TNC. While

landowners selling their easement receive a direct one-time monetary payment, landowners donating an easement usually benefit financially primarily in the form of tax deductions. However, it is possible that landowners who sold, rather than donated their easement may have differing underlying motivations for easement conveyance. It is possible that these motivations may also impact easement satisfaction.

Interview participants were asked if they felt like they received any benefits from their conservation easement. Among NRCS-affiliated landowners, 70% (compared to 86% of TNC-affiliated landowners) indicated they *personally* had received some benefit from their easement, with financial assistance being the most commonly cited benefit. TNC landowners, whose easements were mostly donated, tended to express intangible benefits from their easement in terms of their satisfaction from protecting the environment. When asked if their conservation easement provided any benefits to *society*, 70% of NRCS-affiliated landowners agreed compared to 100% of TNC-affiliated landowners.

Thematic analysis of the telephone interviews revealed three prominent topics common to dissatisfaction with WRP conservation easements but which were not frequently expressed by landowners with TNC-held conservation easements. These three themes included: (1) overly restrictive easement constraints, (2) inflexible land management options and (3) unsatisfactory restoration work, each of which are presented below.

Easement restrictions

While some survey respondents and interviewees who had conservation easements held by other organizations expressed frustration with the restrictions their conservation easements imposed, WRP landowners were consistently more likely to state that these restrictions were a source of considerable dissatisfaction with their conservation easements. The following two quotes illustrate such restriction-related dissatisfaction well:

"It is as if they own the property and I am allowed to enter it to walk around but can do absolutely nothing to it unless I go through a complex process to request actions that I consider my "quiet enjoyment" of my property".

"It feels like selling your soul to the devil. Proceeds from the easement allowed me to keep the property. However, terms of the easement and restrictions have greatly reduced the satisfaction of ownership. It feels more like I'm leasing the place for hunting than owning the property. I've lost the ability to use the property for hay and cattle and to manage it as I see fit."

Management flexibility

Interviewees were asked if they had ever requested a variance to conduct activities prohibited under the easement. In addition, they were asked whether they had ever knowingly or unintentionally violated the easement. Most NRCS landowners interpreted a variance request as requesting permission to conduct management activities, which requires a compatible use agreement (CUA). Half of the NRCS interviewees indicated that they had requested permission to conduct management on

their property, with the most common types of requests being: mowing along roads, planting food plots for deer, allowing grazing and prescribed burning. Eighty percent (8 out of 10) of the WRP landowners interviewed who made such management requests indicated that they did not receive permission to conduct the requested activities. Several expressed frustration with not being allowed to mow their property roads regularly in order to facilitate access to the land. One interviewee was told he could mow roadways only between July 1 and September 15 each year, which makes it very difficult for him to access the property during parts of the year and required larger mowing equipment to cut the accumulated biomass. Another interviewee was required, several years after the WRP easement was implemented, to reduce cultivated food plots from 5 to 1 acre each. This interviewee commented:

"... when I start asking them real pointed questions [about why it was necessary to reduce the feed plots by 80%], they can't answer ... . Why do I need to take my food plots from 5 acres to 1 acre, that is not even as big as my front yard. Can you tell me on 2,000 acres that I just have to leave a couple acres here and there for deer?"

Other landowners indicated frustration with the CUA process itself. While a few reported receiving a CUA decision within 3-4 weeks, others said that the process for approval often takes from six weeks up to several months. As one successive generation landowner explained,

"The government is not very nimble and so you may start this process in January and not get an answer until June ... it is hard to understand why they can't be more efficient"

Furthermore, landowners whose CUA was denied report not knowing the reasons for denial.

"We've filed 25 permits and they have only approved 2. In the original agreement there are certain things you can do and certain things you can't do and we did a compatible agreement we thought there shouldn't be a problem at all we came back and they were all denied and … nobody would even give us an answer."

As a result of such frustrations, more than one landowner reported circumventing the CUA process and conducting management either scheduled around compliance monitoring visits or with the hopes of not getting caught. One landowner described receiving a variance to improve existing roads but was subsequently told that he needed to continue submitting a CUA every 6 months in order to mow those roads, which he found unreasonable. He eventually decided to mow the roads without going through the CUA process. When asked if he would continue to intentionally violate the easement in order to conduct road maintenance, he responded,

"Yes, that is my plan. Until they try to bring legal action, I am just tired of messing with them. I am going to continue to mow those roads and keep it accessible where I can get around my property. If they take me to court, I will just fight it but I think they are being unreasonable in their interpretation of the easement."

Another landowner, very active in conservation, who has multiple conservation easements with more than one organization related,

"Every time I have asked for a compatible use, like planting trees, it has eventually been granted but they take so long that…I just go ahead and do it. When I do bulldozer work,

they always inspect my place in the late spring, so I do all my bulldozer work in the fall and by the time they come around, it is all grassed up and they do not know that anything has been done when they come back the next year."

In contrast, most variances reported by TNC landowners consisted of one-time exceptions. For example, one landowner needed to move a proposed road to facilitate access, another asked to build a new cattle-watering trough in a designated no-development zone and another wanted to harvest trees to improve wildlife habitat. All of these requests were granted, with the interviewees reporting minimal bureaucracy in the approval process. However, one TNC landowner, a rancher dependent on easement land for his livelihood, wanted to incorporate goats into the grazing operations. While this was not expressly prohibited under the easement restrictions, it became a source of contention between TNC and the landowner. This landowner noted that most easement TNC landowners do not rely on their property for income generation and suggested that subsistence level production may be inherently incompatible with the environmental protection goals of many easement holding organizations.

Finally, interview participants were asked what their easement holder could do better, with respect to their particular easement. Many of the TNC landowners provided no specific recommendations but others did express a desire for more communication, particularly in the form of technical assistance and information about conducting appropriate land management specific to their property. One TNC landowner with several different conservation easements summed up this idea saying,

"The reality is unless we go looking for them, we don't hear too much from them outside of monitoring the easement, so I suppose that it wouldn't hurt if TNC staff were to be aware of resources, whether it is grants or training or other help with our management, they could be more pro-active in passing that information on along to us. My sense is that they do not have anybody in our area who's really actively cultivating those landowner relationships but I think that may not be so true in other areas."

NRCS landowners also articulated the need for more communication between themselves and their local NRCS staff contact. However, rather than providing technical assistance, many landowners wanted more information about how to successfully navigate organization hurdles impeding their ability to implement land management.

Restoration work

Several landowners expressed dissatisfaction with the NRCS' oversight of the implementation of the restoration phase of their WRP project. While this issue primarily affects grantor landowners, successive landowners were also affected by poor restoration implementation. One successive landowner explained that the water control structures put into place during the creation of moist-soil units on his WRP were installed incorrectly and therefore do not work as intended. Others recounted restoration projects promised yet not completed. For example one said,

"We [NRCS and the landowner] planted maybe … 30-40 acres of trees and it [restoration plan] called for 200 [acres]. We were supposed to put in a lake, it was supposed to be 27, 28 acres, [but] they've kept cutting back to 8 or 10 acres. Anyway it

has just been a fight all the way and I wasn't in a position to take anybody to court or anything like that."

Another landowner expressed a similar sentiment saying,

"Dealing with bureaucracy/lack of progress is major drawback. None of the improvements/mgmt practices scheduled for this past year were even started by NRCS."

Additionally, some NCRS landowners were told that the NRCS would maintain some components of the restoration work, specifically water control structures. However, many landowners reported that eventually they were told that funding had dried up and maintenance of such structures would be the landowner's responsibility. However, other landowners did not perceive that NRCS would maintain restoration infrastructure. This disconnect may be the result of incomplete or inconsistent communication between NRCS staff and landowners regarding the restoration phase of the project.

Discussion

Given the level of landowner dissatisfaction with the WRP program observed in our mail survey, I relied on individual interviews to better understand specific, common complaints. Three prevailing issues emerged as the most frequently cited causes for dissatisfaction: 1) Initial restoration work was not completed in a timely or satisfactory manner to meet ecological goals, 2) WRP restrictions are too inflexible to allow owners to enjoy the use of their property and 3) NRCS guidelines and bureaucratic hurdles do not allow for timely, adaptive or best management practices on WRP lands. Each is discussed below.

First, as previously stated, WRP easements are based on the creation of new wetland areas or the restoration of previous wetland areas. Because of this, most WRP projects have an initial construction or restoration component. Examples of restoration activities include: installation of water control structures, reforestation tree plantings and fencing. Many of the NRCS landowners interviewed for this study cited concerns about the efficiency and efficacy of the restoration work completed on their property. Some restoration activities were undertaken during incompatible seasons. For example, landowners related stories of reforestation projects started during the late spring or early summer, resulting in complete tree mortality. These errors highlight the need for adequate technical training and guidance on the part of NRCS to its local field staff responsible for coordinating and implementing restoration project work.

Second, as previously discussed, the WRP uses a standardized set of restrictions for all of its perpetual easements. These constraints place particularly severe limitations on how a landowner can use their WRP protected property. While the intent of the restrictions may be to provide the highest level of protection to these properties, I question whether this strategy is the most effective means for ensuring the application practices that support that goal. The other two conservation easement programs administered by the NRCS under the ACEP (GRP and FRPP) do not include the same level of landowner restrictions on property rights. It is possible to restructure WRP restriction guidelines so that landowners are granted more autonomy in making land use decisions without compromising the protections afforded by the easement. Private land trusts have extensive experience negotiating easements that provide more balance

between protections and landowner autonomy. Their experiences may prove to be a good resource for WRP restriction reforms. In addition, landowner constraints are impacting natural resource management on WRP lands. Inability to conduct on-going management not only proved to be a source of landowner dissatisfaction, it also has the ability to undermine the desired outcomes of the WRP program. For example, it is possible that overly bureaucratic hurdles may depress landowners' willingness to engage in land management activities that could maintain or even enhance WRP restored properties. Management inputs are essential to maintaining restored landscapes (Weiher et al. 1996; VanRees-Siewert and Dinsmore 1996). While the WRP program has the highest level of control over retained property rights, it also has the highest level of administrative discretion in allowing or disallowing land management (Rissman et al. 2013). In spite of this broad authority, NRCS has seemingly squandered the opportunity to encourage compatible management on WRP properties.

Third, private landowners are finding that their ability to conduct any management on their land is hampered by bureaucratic roadblocks and by a lack of transparency about decisions regarding CUAs. One potential solution for minimizing management barriers is that NRCS could require landowners wishing to conduct compatible management practices to formalize a management plan developed in collaboration between landowners and local NRCS staff. Approved management plans could cover multiple years and incorporate contingency plans for unpredictable events such as drought or wildfire. Allowing for multi-year planning would reduce NRCS staff time processing CUA's and allow for more locally based decision making. The CUA

process itself was frequently mentioned as a source of frustration among NRCS landowners. One of the issues raised is the amount of time it takes landowners to have a CUA approved. Many land management practices, such as prescribed burning, are only appropriate during certain seasons and untimely approval prevents their effective implementation. During discussions, NRCS staff indicated they were trying to streamline that process to provide a response to a CUA within 4-6 weeks. However, only one of the landowners interviewed indicated that they had received permission to conduct management under a CUA within that time frame.

Another source of contention with the CUA process was the perceived lack of transparency. Landowners reported receiving no feedback about why applications for CUA's are approved or declined. It is possible that many rejected CUA's would be allowed with minimal modifications. NRCS should provide landowners with specific information regarding their reasons for CUA rejection. Local staff should also work closely with partner landowners providing assistance submitting CUA's that conform to NRCS guidelines and are likely to get approved. In response to the lengthy and opaque CUA process, several landowners admitted to conducting management without submitting a CUA. Continuation of this scenario does not serve either the interests of the landowners nor the NRCS. It forces landowners into a situation whereby they are deliberately subverting program rules they agreed to and unnecessarily undermines the property rights purchased by the NRCS. In addition, it likely has a dramatic effect on landowners' level of satisfaction with the WRP.

Moving forward, some of the annual compliance monitoring for the WRP program in Texas is being outsourced to the USFWS. While this may prove beneficial, particularly in regards to providing landowners with technical guidance for best land management practices, it also raises the possibility of an increased disconnect between the NRCS and its partnered landowners. Landowners who wish to conduct management and submit a CUA may find the process even more difficult to negotiate without having an established relationship with their local NRCS field staff contact.

One key demographic difference I found between the easement landowner groups was reliance on their property for a portion of their annual income. NRCS-partnered landowners were more likely to rely on their land for at least a portion of their income and they were more likely to have sold, rather than donated their easement. It is possible that landowners dependent on their land for earnings may feel more disadvantaged by overly restrictive land use regulations, leading to increased easement dissatisfaction. Given that many NRCS easement projects occur within working landscapes, NRCS should consider revising WRP guidelines that allow for increased compatible uses including cattle grazing, haying operations, limited permanent hunting infrastructure and mitigation banking. Options such as these allow landowners to continue receiving financial benefits from their property without compromising the wetland protection goals. The WRP is now part of the Agricultural Conservation Easement Program, a name that suggests combining conservation with working, agricultural landscapes. It stands to reason that landowners participating in this program maintain their ability to continue using these lands in ways that allow production while

meeting conservation goals. However, in its current form, it seems as if the WRP accomplishes neither of these objectives particularly well.

Finally, while this study provides an important assessment of a large-scale permanent conservation easement program from the private landowner perspective, there are several limitations in this research worth discussing. First, our population sample was contained within one state. While the WRP program is used in all 50 states, it is employed most heavily in states along the Mississippi River and its associated drainages, in states bordering the Great Lakes and along the Eastern Seaboard (NRCS 2013). It is possible that some of the issues raised by Texas WRP landowners, particularly those regarding restoration implementation and obtaining management approvals, may be less problematic in other states with different state-level management. However, since the easement restrictions themselves are the same throughout the U.S., I suspect that WRP landowners in general may feel unduly constrained by the WRP easement rules. Our sample size was also relatively small with 45 survey participants and 20 interviews but our results add to the small body of knowledge concerning landowner attitudes about federal conservation programs. Future research that includes multiple states and a larger sample population may provide a more robust analysis to guide policy recommendations. The results of this study also suggest the need for more research in order to better understand how social factors impact easement programs.

An examination of the measured outputs of the program (22 years, ~2 million acres enrolled, 2 billion dollars spent) demonstrates their potential for large-scale conservation programs on private lands. However in order to adequately assess the

benefits of the WRP, we need to look beyond ecological outcomes. Particularly on initiatives conducting conservation on private lands, one of the outcomes that should be considered is how well the program is working from the perspective of the landowner. The results from this study highlight the need to integrate social science into conservation research. Moreover, the use of mixed-methods analysis allows us to gain a richer understanding of how people use and view conservation efforts.

As the WRP transitions into the ACEP, the results of this study provide policy makers with an opportunity to reconsider how these conservation easements are established, implemented and maintained. Combining social science analysis with ecological assessments of easement protected properties is critical for providing a thorough assessment of conservation easement outcomes and determining if conservation easements are an effective investment of public funding dollars.

CHAPTER VI

SUMMARY

Conservation easements have increasingly become one of the primary tools used in preventing open space fragmentation and conversion on private lands. However, in order to adequately assess the effectiveness of conservation easements, it is imperative that we examine not only the outputs of easements (i.e. acres protected and dollars spent) but also the outcomes of easements. These outcomes need to be determined by measuring indicators of the ecological characteristics and processes that the conservation easement is designed to protect as well as an assessment of the sociological effects of easement conveyance.

In my dissertation research, I focused on examining the sociological implications of permanent conservation easements from the perspective of Texas landowners who own land encumbered by such conservation easements. My research project employed two methodologies, mail surveys and telephone interviews, to study landowners' perspectives regarding their perpetual conservation easements. Using the theoretical frameworks provided by private property rights theory, value-belief-norm theory and social exchange theory I addressed five primary questions, which were sequentially addressed in one of the four chapters in the dissertation: 1) What are the private property orientations of landowners with permanent conservation easements? 2) How satisfied are landowners with their conservation easements? 3) How satisfied are landowners with their relationship with the organization that holds their conservation easement? 4) How well do landowners feel they remember and understand the restrictions prescribed in

their conservation easement? 5) What types of land management are landowners using on conservation easement-protected properties?

Here, I address each of these five key questions and summarize the primary results and conclusions from each part of my research.

1) What are the private property orientations of landowners with permanent conservation easements? (Chapter II)

In chapter II of my dissertation, I examined the property rights and landowner responsibilities attitudes of conservation easement landowners as part of the mail survey portion of this study. Using a series of survey questions identical to a 2002 study of rural Texas landowner property rights orientations, I compared the beliefs and attitudes of survey respondents from my study and those from the 2002 study. I also compared intra-group attitudinal differences between those landowners with easements who granted their easement (i.e grantor landowners) and those who did not convey their easement (i.e. successive generation landowners). I expected to find that landowners with conservation easements would exhibit more moderate private property rights beliefs, given that they are already living with a substantially altered property rights regime as part of their conservation easement. I also expected to find that easement landowners would feel a greater responsibility to manage natural resources on their property in ways that benefit their community, given that they were already substantially protecting conservation values on their land. Landowners with conservation easements did express significantly less stringent property rights orientations. However, contrary to expectations, compared to the 2002 landowner survey respondents, they were

significantly less likely to believe that landownership conferred a responsibility to manage their property in ways that benefitted society as a whole. However, comparing conservation easement landowners with the 2002 survey respondent group was complicated by the fact that there were considerable demographical differences between the two groups, and there was a 9 year gap between the two studies, raising the possibility of a broader temporal shift in property rights attitudes during that time. The 2011 survey of conservation easement landowners found no statistically significant differences between grantor landowners and successive generation conservation easement landowners with respect to perspectives about property rights or responsibilities.

2) How satisfied are landowners with their conservation easements? (Chapters III and V)

Chapter III of my dissertation reported on the landowner satisfaction and knowledge of their conservation easements. Generally, landowners in Texas were satisfied with their conservation easements. However, my results uncovered two groups of landowners that were less likely to be satisfied with their conservation easements. The first group was successive generation landowners who acquired their easement-protected property either through inheritance or who purchased the property after the easement was already in place. This group was significantly more inclined to express dissatisfaction with conservation easements. This result has potentially substantial consequences because eventually every property with a conservation easement will be owned by successive generation landowners. This finding is consequential for every

organization holding perpetual conservation easements. Understanding landowners' satisfaction with their conservation easements is imperative because if the underlying social relations between landowners and easement holders become confrontational rather than collaborative, it may undermine the efficacy of conservation easements as a legitimate tool for private land conservation and may also result in escalating legal costs for conservation easement holding organizations.

The second group that was less likely to express satisfaction with their conservation easements was landowners owning property with an easement held by a federal governmental agency, especially the Natural Resources Conservation Service (NRCS). This particular finding guided my decision to conduct follow-up telephone interviews with a subset of the mail survey respondents to explore more specific causes of this dissatisfaction as reported in chapter V of my dissertation. Analysis of the mail survey data uncovered systemic landowner dissatisfaction with the NRCS Wetland Reserve Program (WRP). This contrasted with a review of the limited available literature concerning participant satisfaction with federal perpetual easement programs (Forshay et al. 2005; Esseks and Schilling 2013). This unexpected finding guided my later research efforts to identify the causes of those unfavorable attitudes. I used the mail survey results to guide the design and implementation of the telephone interview component of my research. Using multiple analytical methods allowed integration of the quantitative survey data with qualitative information from the interviews, providing a more complete understanding of landowner experiences and attitudes regarding WRP easements. The resulting information revealed three primary areas of concern: (1) overly restrictive

constraints in WRP easements, (2) inflexible land management options and (3) unsatisfactory restoration work by the NRCS. The first issue concerning the level of restrictions for WRP easements is liable to be a nationwide issue because this program requires the same restrictions for all easements conveyed under it. However, the second and third issues are likely the result of state-level management and may not affect landowners with WRP easements in other areas. Implications of this study include the recommendations that: 1) the WRP consider modifying their program restrictions in a way that allows greater landowner autonomy and 2) the WRP streamlines their process of allowing management on easement properties.

3) How satisfied are landowners with their relationship with the organization that holds their conservation easement? (Chapter III)

As reported in chapter III, I found a high degree of correlation between landowners' level of satisfaction with their easement and their satisfaction with their easement holder; i.e., landowners who reported they were satisfied with their easement tended to also express satisfaction with their easement holder. Consequently, the two groups of landowners who were most unhappy with their relationship with their easement holder were successive generation landowners and landowners having a federally held easement. Frequency of interaction between easement landowners and their easement holding organization was also a significant predictor influencing landowner/easement holder relationships. My results indicated that more frequent interaction was significantly correlated with increased easement satisfaction.

4) How well do landowners feel they remember and understand the restrictions prescribed in their conservation easement? (Chapter III)

My research failed to find any significant variables explaining landowners' self-reported knowledge with their easement. All of the models developed to test landowners' easement knowledge or understanding of the restrictions prescribed in their conservation easements were statistically insignificant. One limitation of my approach was that I asked landowners only, in general, how well they felt that they remembered and understood their easement restrictions. Since most conservation easements are individually negotiated between the grantor landowner and the easement holder, it would be necessary to refer back to each individual easement in order to test the specific knowledge of each landowner. It is possible that many landowners who feel they remember their easement rules may, in fact, forget particular prohibitions, which may lead to unintentional violations of the easement restrictions. This may especially be true for successive generation landowners who did not negotiate the easement agreement in the first place. Given that the majority of litigated easement violations occur with these successive landowners (Rissman and Butsic 2011; Danskin 2000), future research examining possible linkages between easement knowledge and restriction violations would be beneficial for developing strategies designed to prevent future legal conflicts.

5) What types of land management are landowners using on conservation easement-protected properties? (Chapter IV)

My study area covered an extensive region, representing a wide variety of ecological diversity. Because of this, I asked landowners about a wide range of possible

management activities being used on their conservation easement properties. Previous research has demonstrated the potential for enhanced conservation outcomes on easement protects landscapes, in part, because the formation of social networks between easement landowners and the organizations that hold their conservation easements can promote access to financial resources and increased technical guidance (Rissman and Sayre 2012). My research failed to find wide-spread evidence that good relationships between landowners and easement holders was a strong predictor of increased natural resource land management on easement lands. However, anecdotal information, gleaned from telephone interviews with easement landowners, revealed some evidence of close working relationships between landowners and easement holders in some areas. More significantly, I found that motivations for landownership were more likely to influence land management decisions, a finding that has been corroborated in several other contexts (Cross et al. 2011; Sorice et al. 2012; Toledo et al. 2012; Petrzelka et al. 2012). Specifically, we study found that production, investment, and consumptive recreation-oriented (i.e. hunting/fishing) conservation easement landowners were all likely to manage their land in ways that enhance their goals. In contrast, amenity landowners (those who own their properties primarily for non-consumptive recreation), who represented a large proportion of our respondents, were not more likely than landowners in the other ownership motivation groups to implement management practices that would benefit the conservation values of their land.

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APPENDIX A

MAIL SURVEY QUESTIONNAIRE

Conservation Easements in Texas

Understanding the Landowner Perspective

Department of Ecosystem Science and Management Texas A&M University

TAMU 2138

College Station, TX 77843-2138 Fall 2011

This questionnaire should be completed by the addressee or by the individual most knowledgeable about the property encumbered with the conservation easement (if applicable). **All** information you provide to me will remain ***strictly confidential*** and you will not be identified with your answers.

If you encounter a question that does not apply to your property, please indicate this by writing "NA" in the margin next to the question. If you encounter a question for which you do not know the answer, please indicate this by writing "DK" in the margin next to the question.

If you have any questions, please contact Dianne Stroman by phone (903-850-7214) or by email (dstroman@neo.tamu.edu)

INITIAL QUESTION: Are you the owner or manager of a property located in the state of Texas that is encumbered with a perpetual (permanent) conservation easement?

☐ No → Please stop here and return the survey in the envelope provided.

☐ Yes→ Please answer the question below

SECOND QUESTION: What type of landowner entity are you?

☐ Private individual or family (includes family LLC/ partnership/ S-Corp)
☐ Corporation
Please proceed to **SECTION A** below and complete the questionnaire.
☐ Non-governmental Organization
☐ City/municipality
☐ County
☐ State agency
☐ Federal agency
☐ Other (please specify)

If you answered anything other than private individual/family or corporation, proceed to **SECTION B** and complete the rest of the questionnaire.

If you do not own or operate property in Texas that has a permanent conservation easement, you have completed the survey. It is important we hear back from everyone who receives a survey, even if they do not own property with a conservation easement. Thank you for taking the time to place the entire questionnaire in the enclosed addressed envelope, and return it to us. No postage is necessary. We appreciate your assistance and cooperation.

SECTION A – RIGHTS AND RESPONSIBILITES REGARDING PRIVATE LANDS

In this section, we seek information about your perceptions regarding landowner rights and obligations and the use of natural resources on your land. The questions in sections A1 and A2 apply only to property **NOT** covered by the conservation easement.

A1. ***To what extent do you agree or disagree with each of the following statements about your RIGHTS as a landowner?*** FOR EACH STATEMENT CHECK THE BOX THAT BEST REPRESENTS YOUR OPINION.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
My landowner rights include the *right to exclude* others from access to my land.	☐	☐	☐	☐	☐	☐	☐
My landowner rights include the *right to transfer ownership* of my land to others without restriction.	☐	☐	☐	☐	☐	☐	☐
My landowner rights allow me the *exclusive use* of the natural resources provided by the land.	☐	☐	☐	☐	☐	☐	☐
My landowner rights include the *absolute right* to do whatever I want with my land without regard for what others prefer.	☐	☐	☐	☐	☐	☐	☐
My landowner rights allow me to do anything with my land so long as my actions *do not infringe upon my neighbors' rights*.	☐	☐	☐	☐	☐	☐	☐
My landowner rights allow me to do anything with my land so long as my actions *do not conflict with the interests and values of the local community.*	☐	☐	☐	☐	☐	☐	☐
My rights as a landowner have become *increasingly restricted* over time.	☐	☐	☐	☐	☐	☐	☐

A2. ***To what extent do you agree or disagree with each of the following statements about your RESPONSIBILITIES as a landowner?*** FOR EACH STATEMENT CHECK THE BOX THAT BEST REPRESENTS YOUR OPINION.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
My landowner rights place *no obligations* on me.	☐	☐	☐	☐	☐	☐	☐
My landowner rights obligate me to be a *good steward of my land* and to maintain it in good condition for future generations.	☐	☐	☐	☐	☐	☐	☐
My landowner rights obligate me to be a *good steward of water resources on my land* and to maintain them in good condition for future generations.	☐	☐	☐	☐	☐	☐	☐
Natural resources on my land *belong to society*, which allows the public to restrict land uses that cause damage to natural resources.	☐	☐	☐	☐	☐	☐	☐
My landowner rights should obligate me to *leave the land in better shape* than when I acquired it.	☐	☐	☐	☐	☐	☐	☐
My landowner rights should obligate me to *take into account the values and interests of society at large.*	☐	☐	☐	☐	☐	☐	☐

SECTION B – CONSERVATION MANAGEMENT ON PRIVATE EASEMENT LANDS

In this section we are seeking information about land management practices that are applied on your easement property and about your interest in participating in various land management programs.

B1. Which of the following land management practices have you conducted or plan to conduct on your easement property? CHECK ALL THAT APPLY.

	Yes, 1+ yrs. ago	Yes, within last year	Yes, in the future	Unsure	No	N/A
Apply prescribed fire to control invasive brush e.g. cedar, mesquite, yaupon, privet, huisache	☐	☐	☐	☐	☐	☐
Mechanically remove invasive brush	☐	☐	☐	☐	☐	☐
Use chemical herbicides to reduce invasive brush	☐	☐	☐	☐	☐	☐
Mechanically remove terrestrial/aquatic invasive plants (other than brush)	☐	☐	☐	☐	☐	☐
Chemically remove terrestrial/aquatic invasive plants (other than brush)	☐	☐	☐	☐	☐	☐
Reseed rangelands with native grasses and/or forbs	☐	☐	☐	☐	☐	☐
Use rotational grazing system for livestock	☐	☐	☐	☐	☐	☐
Restrict livestock from rivers/creeks/streams	☐	☐	☐	☐	☐	☐
Plant or maintain vegetative buffers along rivers/streams/creeks	☐	☐	☐	☐	☐	☐
Control soil erosion	☐	☐	☐	☐	☐	☐
Census wildlife populations	☐	☐	☐	☐	☐	☐
Provide supplemental food for wildlife	☐	☐	☐	☐	☐	☐
Provide supplemental water sources for wildlife	☐	☐	☐	☐	☐	☐
Conduct selective buck and/or doe harvests	☐	☐	☐	☐	☐	☐
Control feral hog populations	☐	☐	☐	☐	☐	☐
Selectively harvest timber (i.e., no clear cutting)	☐	☐	☐	☐	☐	☐
Reforestation to increase carbon sequestration	☐	☐	☐	☐	☐	☐
Restore forests/woodlands by planting native tree species	☐	☐	☐	☐	☐	☐

B2. **Have you *utilized* any of the following conservation programs on your easement property?** CHECK ALL THAT APPLY

- ☐ USDA Conservation Reserve Program (CRP)
- ☐ USDA Environmental Quality Incentive Program (EQIP)
- ☐ USDA Wetland Reserve Program (WRP)
- ☐ USDA Wildlife Habitat Incentive Program (WHIP)
- ☐ USFWS Partners Program
- ☐ Texas Parks and Wildlife Landowner Incentive Program (LIP)
- ☐ State non-game or endangered species grants
- ☐ Wildlife management association participation
- ☐ Prescribed burning association participation
- ☐ County wildlife tax valuation
- ☐ Other _____

B3. **Would you like to *learn more about* any of the following conservation programs for use on your easement property?** CHECK ALL THAT APPLY

- ☐ USDA Conservation Reserve Program (CRP)
- ☐ USDA Environmental Quality Incentive Program (EQIP)
- ☐ USDA Wetland Reserve Program (WRP)
- ☐ USDA Wildlife Habitat Incentive Program (WHIP)
- ☐ USFWS Partners Program
- ☐ Texas Parks and Wildlife Landowner Incentive Program (LIP)
- ☐ State non-game or endangered species grants
- ☐ Wildlife management association participation
- ☐ Prescribed burning association participation
- ☐ County wildlife tax valuation
- ☐ Other _____

B4. **Are you interested in *participating in* any of the following conservation programs on your easement property in the future?** CHECK ALL THAT APPLY

- ☐ USDA Conservation Reserve Program (CRP)
- ☐ USDA Environmental Quality Incentive Program (EQIP)
- ☐ USDA Wetland Reserve Program (WRP)
- ☐ USDA Wildlife Habitat Incentive Program (WHIP)
- ☐ USFWS Partners Program
- ☐ Texas Parks and Wildlife Landowner Incentive Program (LIP)
- ☐ State non-game or endangered species grants
- ☐ Wildlife management association participation
- ☐ Prescribed burning association participation
- ☐ County wildlife tax valuation
- ☐ Other _____

If you did not check any of the options in B2, B3 and B4, please explain why not?

_____

SECTION C – UNDERSTANDING CONSERVATION EASEMENTS

In the following section we seek information that will help us understand how knowledge of conservation easements changes over time and which factors may influence knowledge and attitudes about easements.

C1. **To what extent do you agree or disagree with the following statements concerning *your particular* conservation easement.** FOR EACH STATEMENT CHECK THE BOX THAT BEST REPRESENTS YOUR OPINION

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
I *remember* most of the land use restrictions contained in my conservation easement.	☐	☐	☐	☐	☐	☐	☐
I *understand* most of the land use restrictions contained in my conservation easement.	☐	☐	☐	☐	☐	☐	☐
I know who (a specific person) at my conservation easement holding organization to contact if I have questions about my conservation easement.	☐	☐	☐	☐	☐	☐	☐
I have a good relationship with the organization that holds my conservation easement.	☐	☐	☐	☐	☐	☐	☐
If I had the opportunity, I would consider granting further conservation easements on additional land that I own.	☐	☐	☐	☐	☐	☐	☐
I am happy to abide by the terms and conditions of the conservation easement on my land.	☐	☐	☐	☐	☐	☐	☐
Given the option, I would terminate the conservation easement on my property.	☐	☐	☐	☐	☐	☐	☐

C2. What type of organization holds your conservation easement?

- ☐ National (works in more than one state)
- ☐ State (works throughout Texas)
- ☐ Local (works in a one or more counties in Texas)

C3. What is the name of your easement holding organization?

_____

C4. How frequently do you interact with your easement holding institution?

- ☐ More than once per year
- ☐ Once a year
- ☐ Less than once per year
- ☐ Never

C5. Do you accompany staff from your easement holding institution when they conduct monitoring visits?

- ☐ Yes, always
- ☐ Yes, sometimes
- ☐ No – If not, why not?_____

C6. In what year was the conservation easement negotiated? _____

C7. Did you negotiate the easement on the property?

- ☐ Yes
- ☐ No – If no, how did you obtain the conservation easement?
  - ☐ Purchased property with easement in place.
  - ☐ Inherited property with easement in place.
  - ☐ Other _____

If you answered "no" to C7, you may proceed to question C11

C8. Did you employ the professional services of an attorney during the easement negotiation?

- ☐ Yes
- ☐ No – If not, why not? _____

C9. Did you include other family members (who did not have an ownership interest in the property at the time of the negotiation) in the negotiation process?

- ☐ Yes
- ☐ No

C10. If you conveyed the conservation easement, what was your reason/s for granting the easement?

_____

SECTION D – EASEMENT LANDOWNER CHARACTERISTICS

Landowners who have property with conservation easements are a diverse group. In this section we are seeking information to understand how different types of landowners relate to their easements. All of the information you provide to us will remain strictly confidential and you will not be identified with your answers. Following the strict guidelines at Texas A&M University, we will not release this information to any individual, business or government agency.

D1. **People own their places for many reasons. For each item below, please check the box that indicates how important each reason is to you as to why you own your conservation easement property.** FOR EACH STATEMENT CHECK THE BOX THAT BEST REPRESENTS YOUR OPINION

I own my place:	Not at all Important	Unimportant	Somewhat Unimportant	Moderately Important	Somewhat Important	Important	Very Important
To operate a farm/ranch	☐	☐	☐	☐	☐	☐	☐
For hay/forage production	☐	☐	☐	☐	☐	☐	☐
As a place to relax	☐	☐	☐	☐	☐	☐	☐
For mineral extraction	☐	☐	☐	☐	☐	☐	☐
As a financial investment	☐	☐	☐	☐	☐	☐	☐
For livestock production	☐	☐	☐	☐	☐	☐	☐
To operate a hunting enterprise	☐	☐	☐	☐	☐	☐	☐
To enjoy the outdoors	☐	☐	☐	☐	☐	☐	☐
To earn a profit	☐	☐	☐	☐	☐	☐	☐
For hunting/fishing (recreational)	☐	☐	☐	☐	☐	☐	☐
To cultivate crops	☐	☐	☐	☐	☐	☐	☐
For wildlife management	☐	☐	☐	☐	☐	☐	☐
To sell the land someday at a profit	☐	☐	☐	☐	☐	☐	☐
For non-hunting/fishing recreation	☐	☐	☐	☐	☐	☐	☐

D2. In what year were you born? _____

D3. What is your gender: ☐ Male ☐ Female

D4. How many years of formal education do you have?_____**years**

D5. What is or was your *primary occupation*. Please tell us even if you are currently unemployed, retired or disabled.

_____

D6. How do you characterize your residency on your conservation easement property?

- ☐ I am a full time resident of the property
- ☐ I am a weekend resident of the property
- ☐ I am a non-resident of the property – If you are non-resident:
  - About how far from the property do you live_____(miles)
  - How frequently do you visit the property_____times per year

D7. Do you consider the place where you live and the place where your easement property is located to be:

- ☐ In the same community
- ☐ In a different community

D8. How large is your conservation easement property?_____**(acres)**

D9. In which county or counties is your easement property located? _____

D10. What proportion of your property is covered by the conservation easement? _____**(percent)**

D11. How long have you owned your conservation easement property?

_____**(years)**

D12. How long has the conservation easement property been in your family?

_____**(years)**

D13. In a typical year, approximately what percent of your annual income was generated from activities on your conservation easement property?

- ☐ 0%
- ☐ 1% to 25%
- ☐ 26% to 50%
- ☐ 51% to 75%
- ☐ 76% to 99%
- ☐ 100%

Please share any other comments you have about your conservation easement or conservation easements in general.

_____

_____

_____

_____

_____

As part of this research, we will also conduct a telephone survey to ask landowners for more detailed information about conservation easements. The interview should take 30-45 minutes. We hope you will be willing to participate. In order to reach you, please provide your name and telephone number where you can be reached. Thank you. As with this survey questionnaire, any information you provide during the telephone interview will remain STRICTLY CONFIDENTIAL.

Name: _____

Tel. Number: _____

APPENDIX B

NON-RESPONSE BIAS SURVEY QUESTIONNAIRE

Spring 2012
Texas A&M University, Department of Ecosystem Science and Management
Conservation Easements in Texas; Understanding the Landowner Perspective

1. **What type of landowner entity are you?**
   - ☐ Private individual or family (includes family LLC/partnership/S-Corp)
   - ☐ Corporation ☐ Non-governmental organization ☐City/ municipality
   - ☐ County ☐ State agency ☐ Federal agency ☐ Other (please specify)_____

2. **In what year were you born? _____**

3. **Did you negotiate the easement on the property?**
   - ☐ Yes ☐ No- if no, how did you obtain the conservation easement?
     - o Purchased property with easement in place
     - o Inherited property with easement in place
     - o Other _____

4. **How frequently do you interact with your easement holding institution?**
   - ☐ More than once per year ☐ Once a year ☐ Less than once per year ☐ Never

5. **How do you characterize your residency on your conservation easement property?**
   - ☐ I am a full time resident ☐ I am a weekend resident ☐ I am a non-resident of the property

6. **To what extent do you agree with the following statements concerning <u>your particular</u> conservation easement?** For each statement check the box that best represents your opinion.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
I am happy to abide by the terms and conditions of the conservation easement on my land.	□	□	□	□	□	□	□
Given the option, I would terminate the conservation easement on my property.	□	□	□	□	□	□	□

7. In order to assess the broader impact of this survey, please let us know why you did not respond. Check all that apply.
   - ☐ I did not receive the survey ☐ I did not believe that the survey was really confidential
   - ☐ The survey did not pertain to me ☐ Lack of time ☐ Survey was too long ☐ I chose not to participate

Other _____